lenovo

Installation and User Guide

ThinkServer TS200
Machine Types: 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530

ThinkServer TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530

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Installation and User Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 183 and the *Warranty and Support Information* document on the Lenovo® *ThinkServer Documentation* DVD.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* book.

For example, if a caution statement is labeled ″Statement 1,″ translations for that caution statement are in the *Safety Information* book under ″Statement 1.″

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:

CAUTION:
When replacing the lithium battery, use only Part Number 33F8354 or an equivalent type battery. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:

≥ 18 kg (39.7 lb.)

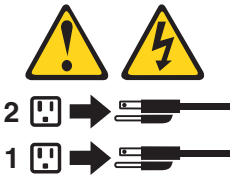
≥ 32 kg (70.5 lb.)

≥ 55 kg (121.2 lb.)

CAUTION:
Use safe practices when lifting.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 11:

CAUTION:
The following label indicates sharp edges, corners, or joints nearby.

Statement 12:

CAUTION:
The following label indicates a hot surface nearby.

Statement 13:

DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 15:

CAUTION:
Make sure that the rack is secured properly to avoid tipping when the server unit is extended.

Statement 17:

CAUTION:
The following label indicates moving parts nearby.

Statement 26:

CAUTION:
Do not place any object on top of rack-mounted devices.

Attention: This product is suitable for use on an IT power distribution system whose maximum phase to phase voltage is 240 V under any distribution fault condition.

Chapter 1. Introduction

This *Installation and User Guide* is intended to use with your Lenovo® ThinkServer™ TS200 (Machine Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530) server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing options and replacing customer replaceable units (CRUs)
- Solving problems

The server comes with the *ThinkServer EasyStartup* DVD to help you configure the hardware, install device drivers, and install the operating system.

The server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document on the *ThinkServer Documentation* DVD. To obtain up-to-date information about the server and other Lenovo products, go to: http://www.lenovo.com/thinkserver.

Record information about the server in the following table. You will need this information when you register the server with Lenovo.

Product name	ThinkServer TS200
Machine type	6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530
Model number	_____
Serial number	_____

The model number and serial number are on labels on the bottom of the server and on the front, visible through the bezel, as shown in the following illustration.

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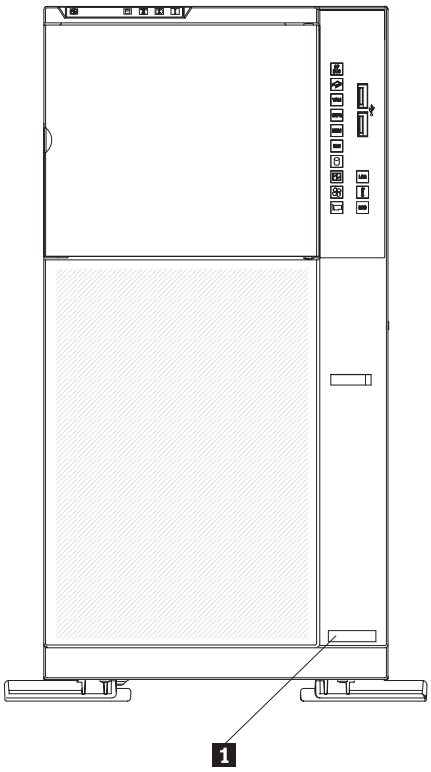

1 Model and machine type

For a list of supported optional devices for the server, go to http://www.lenovo.com/thinkserver and click the **Options** tab.

Notices and statements in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the Lenovo *ThinkServer Documentation* DVD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Related documentation

The Lenovo *ThinkServer Documentation* DVD contains documentation for the server in Portable Document Format (PDF). The Lenovo *ThinkServer Documentation* DVD requires the Adobe® Reader 5.0 (or later) or xpdf, which comes with Linux® operating systems.

The following table describes the content and location of documentation that is provided with your server.

Document	Description	Location
Read Me First	This document directs you to the *ThinkServer Documentation* DVD for complete warranty and support information.	printed, provided in server packaging
Important Notices	This document includes safety and legal notices that you are expected to read before using the server.	printed, provided in server packaging
Hardware Maintenance Manual	This document provides diagnostic information, parts listing, and replacement procedures for all field replaceable units (parts replaced by trained service personnel) as well as all customer replaceable units (CRUs).	Lenovo Support Web site: http://www.lenovo.com/support
Warranty and Support Information	This document includes the warranty statement and information about how to contact Lenovo Support.	Available on the *ThinkServer Documentation* DVD
Safety Information	This document includes translations of all of the safety statements used in the ThinkServer documentation.	Available on the *ThinkServer Documentation* DVD

Chapter 2. Server setup roadmap

The installation process varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and just needs to be connected to power and the network and started. In other cases, the server needs to have hardware features installed, requires hardware and firmware configuration, and requires the operating system to be installed.

Table 1. Server setup roadmap

Task	Where to find information
Unpack	Chapter 3, “What is included with your server,” on page 7
Install hardware features	Chapter 5, “Installing and replacing optional devices,” on page 29 Chapter 6, “Installing and replacing customer replaceable units,” on page 73
Connect Ethernet cable and power cords to network and power connectors	“Rear view” on page 18
Start the server to verify operation	“Turning on the server” on page 26
Review UEFI settings and customize as needed	“Starting the Setup Utility” on page 110
Configure RAID controllers and arrays	“RAID controllers” on page 115
Check for firmware updates	“Using the EasyUpdate Firmware Updater tool” on page 123
Install operating system and basic drivers	“Using the ThinkServer EasyStartup program” on page 117
Install any additional drivers needed for added features	Refer to the instructions that came with the hardware option.
Configure Ethernet settings in operating system	See the operating system help. This step is not required if the operating system was installed using the ThinkServer EasyStartup program.
Test Integrated Management Module (requires the IMM Premium option)	“Using the Integrated Management Module” on page 123
Install remote management applications	“Installing ThinkServer EasyManage software” on page 126
Install applications	Refer to the documentation that accompanies the applications that you want to install.

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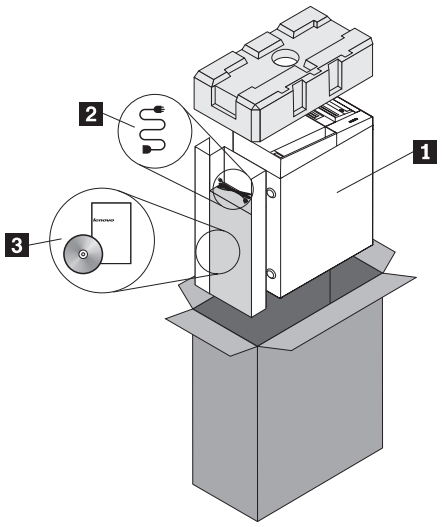
Chapter 3. What is included with your server

The TS200 server package includes the server, power cords, the *ThinkServer Documentation* DVD, and software media.



1 Server
2 Power cords
3 Documentation and software media

Features and technologies

The TS200 server offers the following features and technologies:

- **UEFI-compliant server firmware**

  The server firmware offers several features, including Unified Extensible Firmware Interface (UEFI) 2.1 compliance, enhanced RAS capabilities, and BIOS compatibility support. UEFI replaces the basic input/output system (BIOS) and defines a standard interface between the operating system, platform firmware, and external devices. UEFI-compliant servers are capable of starting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

  Note: The server does not support DOS (Disk Operating System).

- **Systems-management capabilities**

  The integrated management module (IMM) combines service processor functions, video controller, and remote presence function in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. The IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through industry-standard interfaces:

  – Intelligent Platform Management Interface (IPMI) version 2.0
  – Simple Network Management Protocol (SNMP) version 3
  – Common Information Model (CIM)
  – Web browser

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- **Remote presence capability and blue-screen capture**

  The remote presence feature provides the following functions:

  – Remotely viewing video with graphics resolutions up to 1600 x 1200 at 85 Hz, regardless of the system state

  – Remotely accessing the server, using the keyboard and mouse from a remote client

  – Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server

  – Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

  The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

- **Preboot diagnostics programs**

  The preboot diagnostics programs are stored on the integrated USB memory. It collects and analyzes system information to aid in diagnosing server problems. The diagnostics programs collect the following information about the server:

  – System configuration

  – Network interfaces and settings

  – Installed hardware

  – Service processor status and configuration

  – Vital product data, firmware, and UEFI (formerly BIOS) configuration

  – Hard disk drive health

  – RAID controller configuration

  – Event logs for service processors

  The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to Lenovo service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to a removable media and view the log from a Web browser.

  For additional information about preboot diagnostics, see the *Hardware Maintenance Manual*.

- **EasyStartup DVD**

  The ThinkServer EasyStartup program guides you through the configuration of the hardware, the RAID controller, and the installation of the operating system and device drivers.

- **EasyManage DVD**

  The ThinkServer EasyManage program helps you manage and administer your servers and clients through remote problem notification as well as monitoring and alerting.

- **Integrated network support**

  The server comes with an integrated dual-port Intel 82574L Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see “Configuring the Gigabit Ethernet controller” on page 122.

- **Intelligent Platform Management Interface (IPMI) 2.0**

The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Large data-storage capacity and hot-swap capability**

  Some hot-swap server models support four 3.5-inch hot-swap hard disk drives. With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

  The server supports up to 32 GB of system memory when registered DIMMs are installed. The server supports up to 16 GB of memory when unbuffered DIMMs are installed. The memory controller supports error correcting code (ECC) and non-error correcting code for up to 6 industry-standard PC3-8500, or PC3-10600R-999 (single-rank or dual-rank), 1066 and 1333 MHz, DDR3 (third-generation double-data-rate), registered, and unbuffered synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Redundant connection**

  The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **High-performance graphics controller**

  The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **Redundant connection**

  The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Dual-core or quad-core processing**

  The server supports one Intel Xeon dual-core or quad-core microprocessor.

- **RAID support**

  The server supports an internal RAID SAS Controller, which is required for you to use the hot-swap hard disk drives and to create redundant array of independent disks (RAID) configurations.

- **TCP/IP offload engine (TOE) support**

  The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessors and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE.

  Note: As of the date of this document, the Linux® operating system does not support TOE.

Specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Table 2. Features and specifications

Microprocessor:

- Supports one Intel® Xeon® 3400 series quad-core microprocessor
- Designed for LGA 1156 socket
- Scalable up to four cores
- 32 KB instruction cache, 32 KB data cache, and up to 8 MB cache that is shared among the cores
- Support for Intel Extended Memory 64 Technology (EM64T)

Note:

- Use the Setup Utility to determine the type and speed of the microprocessor.
- For a list of supported microprocessors, see http://www.lenovo.com/thinkserver/ and click the Options tab.

Memory:

- Minimum: 1 GB
- Maximum: 32 GB
  - 16 GB using unbuffered DIMMs (UDIMMs)
  - 32 GB using registered DIMMs (RDIMMs)
- Types: PC3-8500 or PC3-10600R-999 (single-rank or double-rank), 1066, and 1333 MHz, ECC, DDR3 registered or unbuffered SDRAM DIMMs only
- Connectors: Six dual inline memory module (DIMM) connectors, two-way interleaved
- Supports:
  - 1 GB, 2 GB, and 4 GB (when available) unbuffered DIMMs
  - 1 GB, 2 GB, 4 GB, and 8 GB (when available) registered DIMMs

SATA optical drives:

- UltraSlim DVD-ROM combo (optional)
- Multi-burner (optional)

Hard disk drive expansion bays (depending on the model): Up to four 3.5-inch hot-swap SAS or up to four 3.5-inch hot-swap SATA hard disk drive bays

Up to six expansion slots (depending on model):

- Six expansion slots on the system board
- Two PCI Express Gen2 x8 slots (x8 links)
- One PCI Express Gen2 x4 slot (x4 link)
- Two PCI 32-bit/33 MHz slots
- One PCI Express Gen2 x4 slot (x4 electrical and mechanical) for the ServeRAID BR10il adapter

Power supply:

One 401-watt power supply or two 430-watt high efficiency power supply

Fans: The server comes standard with three speed-controlled fans.

Integrated functions:

- Integrated management module (IMM), which provides service processor control and monitoring functions, video controller, and (when the optional virtual media key is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities
- Intel 82574L Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN support
- Seven Universal Serial Bus (USB) 2.0 ports (two front and four rear of the chassis), one internal for the optional USB Hypervisor key
- Two Ethernet ports
- Four-port integrated SATA controller
- Integrated Trusted Platform Module (TPM) support
- One serial port
- One VGA port

Table 2. Features and specifications (continued)

RAID controllers:

- ServeRAID BR10il
- ServeRAID-MR10i
- ServeRAID-M1015
- ServeRAID M5015
- ServeRAID MR10is VAULT

Acoustical noise emissions:

- Sound power, idling: 6.5 bels maximum
- Sound power, operating: 6.5 bels maximum

Environment:

- Air temperature:
  - Server on: 10°C to 35°C (50.0°F to 95.0°F); altitude: 0 to 914.4 m (3000 ft)
  - Server on: 10°C to 32°C (50.0°F to 89.6°F); altitude: 914.4 m (3000 ft) to 2133.6 m (7000.0 ft)
  - Server off: 10°C to 43°C (50°F to 109.4°F); maximum altitude: 2133.6 m (7000.0 ft)
  - Shipping: -40°C to 60°C (-104°F to 140°F)
- Humidity:
  - Server on: 8% to 80%
  - Server off: 8% to 80%
- Particulate contamination:

  Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server.

Video controller (integrated into IMM):

- Matrox G200
- Compatible with SVGA and VGA
- 128 MB SDRAM video memory

Note: The maximum video resolution is 1280 x 1024

Size:

- Height: 448 mm (17.63 inches)
- Depth: 483 mm (19.01 inches)
- Width: 265 mm (10.43 inches)
- Maximum weight: 20.8 kg (45.86 lb) when fully configured

Heat output:

Approximate heat output:

- Minimum configuration: 630 BTU per hour (185 watts)
- Maximum configuration: 1784 BTU per hour (523 watts)

Electrical input:

- Sine-wave input (50 / 60 Hz) required
- Input voltage low range:
  - Minimum: 100 V ac
  - Maximum: 127 V ac
- Input voltage high range:
  - Minimum: 200 V ac
  - Maximum: 240 V ac
- Input kilovolt-amperes (kVA), approximately:
  - Minimum: 0.102 kVA
  - Maximum: 0.55 kVA

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. The sound levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The noise emission level stated is the declared (upper limit) sound-power level, in bels, for a random sample of system.
3. There is no keyboard connector or mouse connector on the server. You can connect a USB keyboard and USB mouse to the server by using the USB connectors.

Software

Lenovo provides software to help get your server up and running.

EasyStartup

The ThinkServer EasyStartup program simplifies the process of your RAID controller and installing supported Microsoft® Windows and Linux operating systems and device drivers on your server. The EasyStartup program is provided with your server on DVD. The DVD is self starting (bootable). The user guide for the EasyStartup program is on the DVD and can be accessed directly from the program interface. For additional information, see “Using the ThinkServer EasyStartup program” on page 117.

EasyManage

The ThinkServer EasyManage Core Server provides centralized hardware and software inventory management and secure automated system management through a centralized console. The ThinkServer EasyManage Agent enables other clients on the network to be managed by the centralized console. The ThinkServer EasyManage Core Server is supported on Microsoft Windows Server 2008 (32-bit) products. The ThinkServer EasyManage Agent is supported on 32-bit and 64-bit Windows, Red Hat, and SUSE operating systems.

Reliability, availability, and serviceability

Three important server design features are reliability, availability, and serviceability (RAS). The RAS features help to ensure the integrity of the data that is stored on the server, the availability of the server when you need it, and the ease with which you can diagnose and correct problems.

The server has the following RAS features:

- Advanced Configuration and Power Interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Automatic error retry or recovery
- Automatic memory downsizing on error detection
- Automatic restart on nonmaskable interrupt (NMI)
- Automatic Server Restart (ASR) logic supporting a system restart when the operating system becomes unresponsive
- Automatic server restart after a power failure, based on the UEFI setting
- Availability of microcode level
- Automatic BIOS Recovery (ABR)
- Built-in, menu-driven setup, system configuration, and redundant array of independent disks (RAID) configuration
- Built-in monitoring for fan, power, temperature, and voltage
- Cooling fans with speed-sensing capability
- Customer support center that is available 24 hours a day, 7 days a week[1]
- Diagnostic support of ServeRAID adapters
- Error codes and messages
- Error correcting code (ECC) double-data-rate (DDR) synchronous dynamic random access memory (SDRAM) with serial presence detect (SPD)
- Error logging of POST failures
- Hot-swap SAS hard disk drives
- Integrated Ethernet controllers
- Intelligent Platform Management Interface (IPMI) 2.0
- Key-lock support for physical security
- Memory change messages posted to the error log
- Power-on self-test (POST)
- Hardware Failure Prediction alerts
- Read-only memory (ROM) checksums
- Redundant Ethernet capabilities (requires an optional Ethernet adapter) with failover support
- Standby voltage for systems-management features and monitoring
- System auto-configuring from the configuration menu
- System-error LED on the front bezel and diagnostics LEDs on the system board
- Upgradeable microcode for POST, UEFI, and read-only memory (ROM) resident code, locally or over a LAN
- VPD: includes serial-number information and replacement part numbers, stored in nonvolatile memory, for easier remote maintenance

1. Service availability will vary by country. Response time varies; may exclude holidays.

- Wake on LAN capability

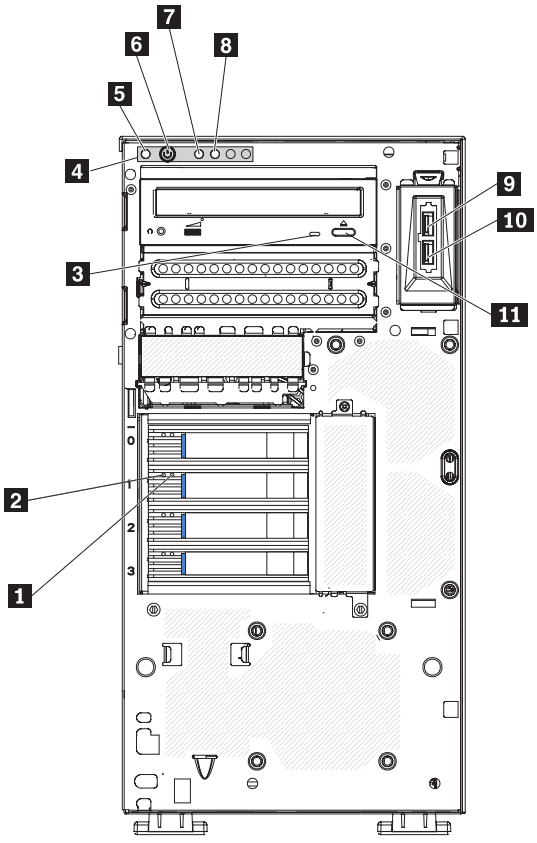
Chapter 4. Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

Front view

The following illustrations show the controls, LEDs, and connectors on the front of the server models.

The following is an illustration of the 3.5-inch SAS/SATA hot-swap hard disk drive model:



1	Hard disk drive activity LED (green)	7	Hard disk drive activity LED
2	Hard disk drive status LED (amber)	8	System error LED
3	DVD drive activity LED (green)	9	USB 2
4	Front information panel	10	USB 1
5	Power-on LED	11	DVD-eject button
6	Power-control button		

The following is an illustration of the 3.5-inch SATA simple-swap hard disk drive model:

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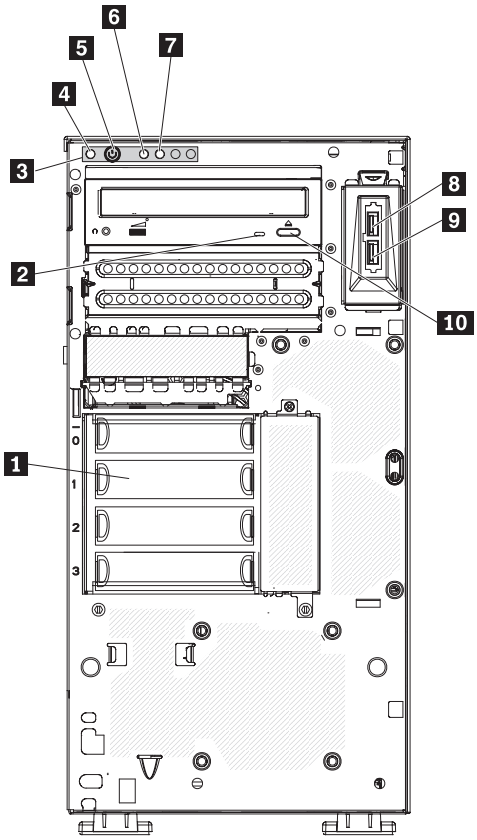


1	Simple-swap hard disk drive	6	Hard disk drive activity LED
2	DVD drive activity LED (green)	7	System error LED
3	Front information panel	8	USB 2
4	Power-on LED	9	USB 1
5	Power-control button	10	DVD-eject button

DVD drive activity LED: When this LED is lit, it indicates that the DVD drive is in use.

System-power LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A system-power LED is also on the rear of the server.

Power-control button and power-on LED: Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:

Off: AC power is not present, or the power supply or the LED itself has failed.

Flashing rapidly (4 times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.

Flashing slowly (once per second): The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

Lit: The server is turned on.

Fading on and off: The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See “Logging on to the Web interface” on page 125 for information on logging on to the IMM Web interface.

Hard-disk drive activity LED: When this LED is flashing, it indicates that a hard disk drive is in use.

System-locator LED: Use this LED to visually locate the server among other servers.

System-information LED: When this LED is lit, it indicates that a noncritical event has occurred.

System-error LED: When this LED is lit, it indicates that a system error has occurred.

USB 1 and 2 connectors: Connect USB devices to these connectors.

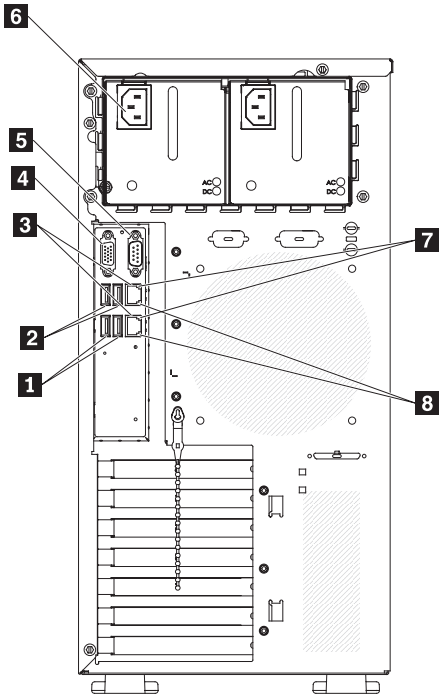
DVD-eject button: Press this button to release a CD or DVD from the DVD drive.

Hard-disk drive status LED: On some server models, each hot-swap hard disk drive has a status LED. When this LED is lit, it indicates that the drive has failed. If an optional RAID controller is installed in the server, when this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Hard-disk drive activity LED: When this LED is flashing, it indicates that the drive is in use.

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.



1	USB 3 and 4	5	Serial (Com1)
2	USB 1 and 2	6	Power cord connector
3	Ethernet connectors	7	Ethernet transmit/receive activity LED (amber)
4	Video connector	8	Ethernet link status LED (green)

USB 1-4 connectors: Connect a USB device, such as USB mouse or keyboard, to any of these connectors.

Ethernet 10/100/1000 connector: Use these connectors to connect the server to a network.

Power-cord connector: Connect the power cord to this connector.

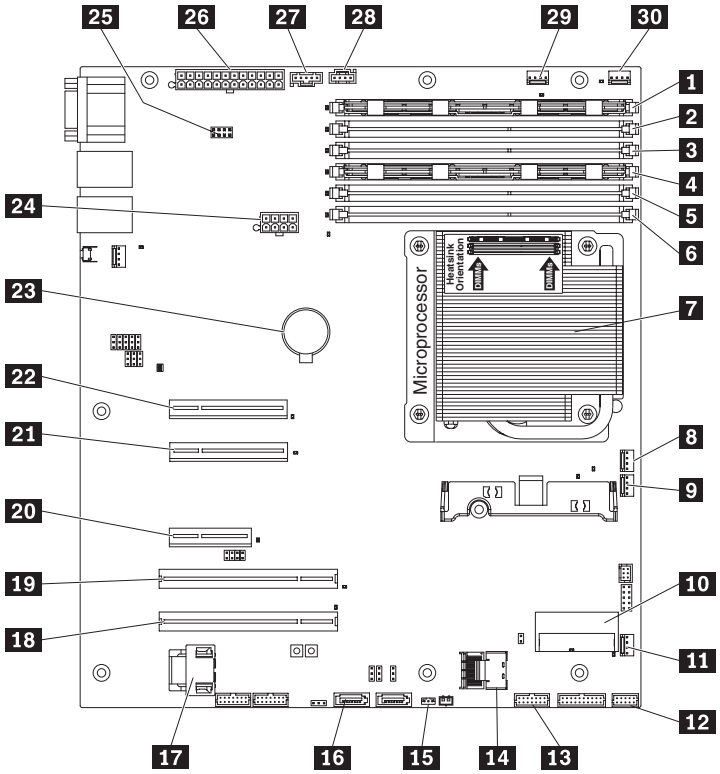
Video connector: Connect a monitor to this connector.

Serial 1 connector (COM 1): Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module (IMM). The IMM can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).

Ethernet connectors: Use either of these connectors to connect the server to a network. When you use the Ethernet 1 connector, the network can be shared with the IMM through a single network cable.

System-board internal connectors

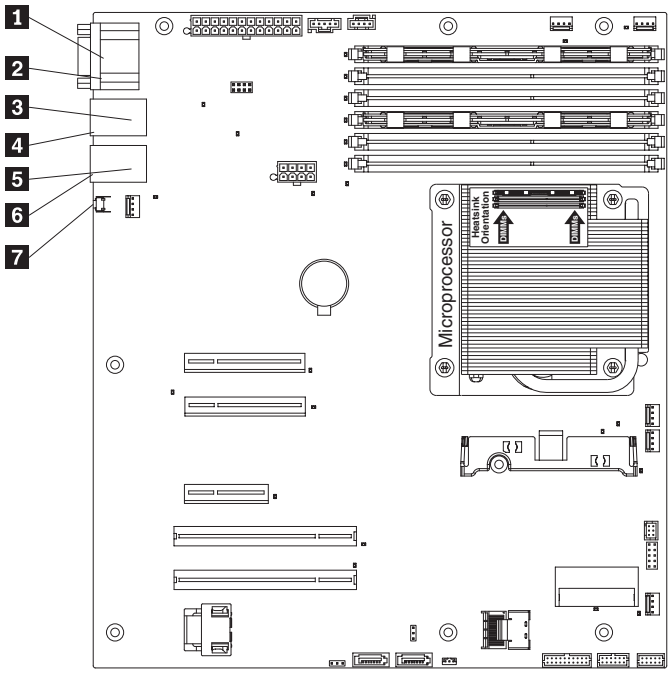
The following illustrations show the internal connectors and switches on the system board.



1 DIMM 1	11 Fan 1 connector	21 Slot 2: PCIe2 x8, 25w
2 DIMM 2	12 Hard disk backplane configuration connector	22 Slot 1: PCIe2 x8, 25w
3 DIMM 3	13 Operator information panel connector	23 Battery
4 DIMM 4	14 Simple-swap HDD backplane signal connector	24 Power 2 connector
5 DIMM 5	15 Wake-on-LAN connector	25 Virtual media key connector
6 DIMM 6	16 Optical drive connector	26 Power 1 connector
7 Microprocessor	17 Hypervisor flash device connector	27 Power 3 connector
8 Fan 3 connector	18 Slot 5: PCI 32-bit, 33 MHz	28 Power 4 connector
9 Fan 2 connector	19 Slot 4: PCI 32-bit, 33 MHz	29 Not used
10 RAID controller connector	20 Slot 3: PCIe2 x1, 10w	30 Not used

System-board external connectors

The following illustration shows the external input/output connectors and the NMI button on the system board.



1	Serial (com 1) connector	5	Ethernet connector 2
2	Video connector	6	USB connectors 3 and 4

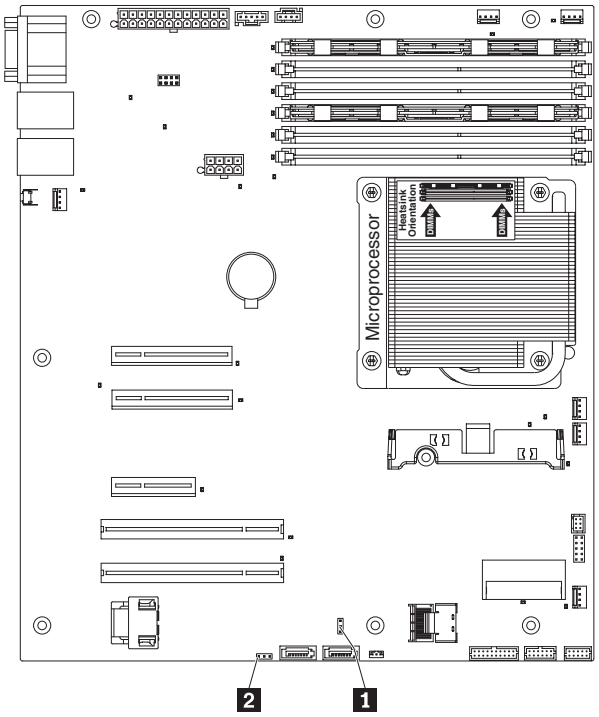
3 Ethernet connector 1

4 USB connectors 1 and 2

7 SW1 (NMI button)

System-board switches and jumpers

The following illustration shows the switches and jumpers on the system board.



The following table describes the jumpers on the system board.

Table 3. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper 1	• Pins 1 and 2: Keep CMOS data (default). • Pins 2 and 3: Clear CMOS data (including power-on password and administrator password)
JP6	Boot block jumper 2	• Pins 1 and 2: Boot from primary BIOS page (default) . • Pins 2 and 3: Boot from backup BIOS page.

Notes:

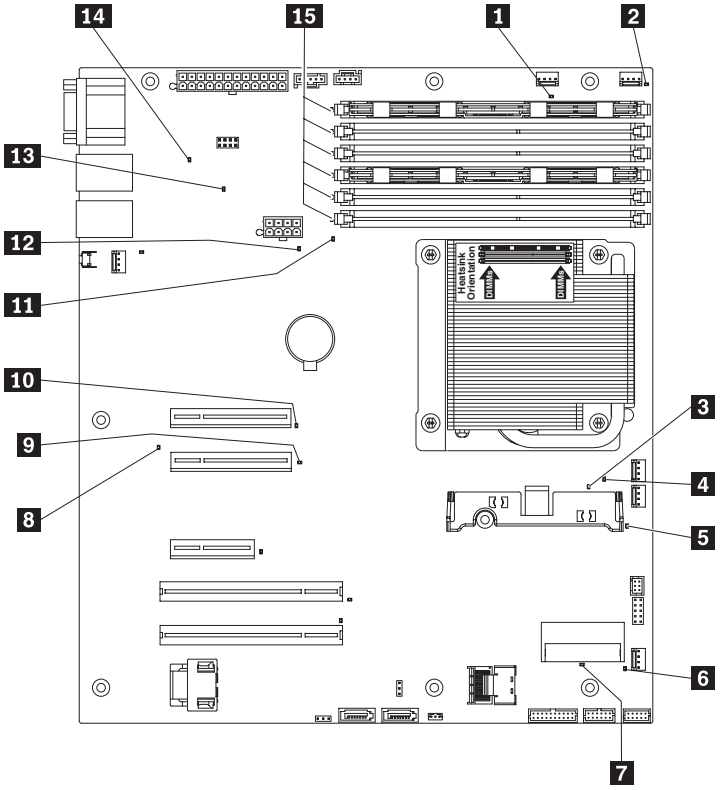
1. If no jumper is present, the server responds as if the pins are set to 1 and 2.
2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in “Installation guidelines” on page 29, “Handling static-sensitive devices” on page 31, and “Turning off the server” on page 28.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the LEDs on the system board.



1	Fan 5 error LED	9	PCI Express slot 2 error LED
2	Fan 4 error LED	10	PCI Express slot 1 error LED
3	H8 Heartbeat LED	11	Microprocessor error LED
4	Fan 3 error LED	12	Battery error LED
5	Fan 2 error LED	13	Standby power LED
6	Fan 1 error LED	14	System board error LED
7	SAS/SATA Controller LED	15	DIMM 1-6 error LEDs
8	IMM heart beat LED		

Table 4. System-board LEDs

LED	Description
Error LEDs	When one of these LEDs is lit, it indicates that the associated component has failed.

Table 4. System-board LEDs (continued)

LED	Description
Baseboard management controller heartbeat LED	This LED flashes to indicate that the IMM is functioning normally.
Standby power LED	When this LED is lit, it indicates that the server is connected to ac power.

The following table describes the LEDs on the system board and extender card and suggested actions to correct the detected problems.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System error or information LED lit	Description	Action
DIMM 1 to DIMM 6 error LEDs	A DIMM has failed or is incorrectly installed.	1. Remove the DIMM that is indicated by a lit error LED. 2. Reseat the DIMM. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMM b. (Trained service technician only) System board
CPU 1 error LED	Microprocessor 1 has failed, is missing, or has been incorrectly installed. **Note:** (Trained service technician only) Make sure that the microprocessors are installed in the correct sequence; see the procedures for removing and installing a microprocessor in the *Hardware Maintenance Manual*.	1. Check the system-event log to determine the reason for the lit LED. 2. (Trained service technician) Reseat the failing microprocessor. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Failing microprocessor b. (Trained service technician only) System board
CPU mismatch LED	A mismatched microprocessor has been installed. **Note:** All microprocessors must have the same speed and cache size.	1. Run the Setup Utility and view the microprocessor information to compare the installed microprocessor specifications. 2. (Trained service technician only) Remove and replace one of the microprocessors so that they both match.
VRM failure LED	Microprocessor 2 VRM has failed or is incorrectly installed.	1. Reseat the VRM 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. VRM b. (Trained service technician only) System board 3. Replace the VRM
System-board error LED	System-board CPU VRD, power voltage regulators, or both have failed.	(Trained service technician only) Replace the system board.

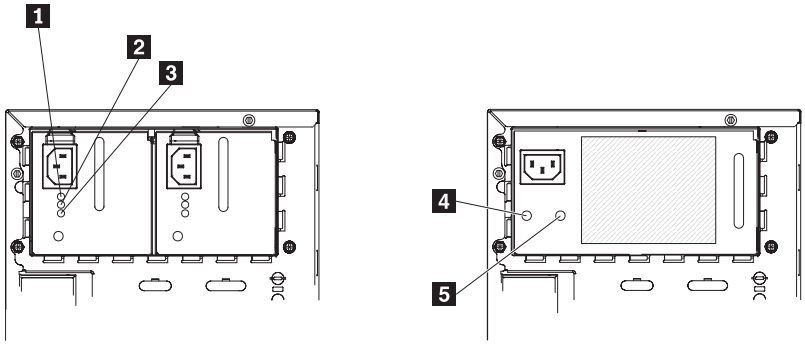
- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

System error or information LED lit	Description	Action
Battery failure LED	Battery low.	1. Replace the CMOS lithium battery, if necessary. 2. (Trained service technician only) Replace the system board.
IMM heartbeat LED	Indicates the status of the boot process of the IMM. When the server is connected to power this LED flashes quickly to indicate that the IMM code is loading. When the loading is complete, the LED stops flashing briefly and then flashes slowly to indicate that the IMM if fully operational and you can press the power-control button to start the server.	If the LED does not begin flashing within 30 seconds of when the server is connected to power, do the following: 1. (Trained service technician only) Use the IMM recovery switch to recover the firmware (see "System-board switches and jumpers" on page 21). 2. (Trained service technician only) Replace the system board.
PCI slot 1 to PCI slot 8 error LEDs	An error has occurred on a PCI bus or on the system board. An additional LED is lit next to a failing PCI slot.	1. Check the system-event log for information about the error. 2. If you cannot isolate the failing adapter through the LEDs and the information in the system-event log, remove one adapter at a time, and restart the server after each adapter is removed. 3. If the failure remains, call Lenovo Service and Support for additional troubleshooting information.
H8 heartbeat LED	Indicates the status of power-on and power-off sequencing.	1. If the H8 heartbeat LED is blinking at a 1 Hz rate, no action is necessary. 2. (Trained service technician only) If the H8 heartbeat LED is not blinking, replace the system board.

Power-supply LEDs

The following minimum configuration is required for the server to start:
- One microprocessor
- One 1 GB DIMM
- Power supply
- Power cord
- ServeRAID SAS/SATA adapter
- System board assembly

The following illustration shows the location of the power supply LEDs:



1 AC power LED
2 DC power LED
3 Fault LED
4 Fault LED
5 Power LED

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED on the front information panel and suggested actions to correct the detected problems.

Table 5. Power-supply LEDs

Power-supply LEDs			Description	Action	Notes
AC	**DC**	**Error**			
Off	Off	Off	No ac power to the server or a problem with the ac power source	1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Turn the server off and then turn the server back on. 4. If the problem remains, replace the power supply.	This is a normal condition when no ac power is present.
Off	Off	On	No ac power to the server or a problem with the ac power source and the power supply had detected an internal problem	1. Replace the power supply. 2. Make sure that the power cord is connected to a functioning power source.	This happens only when a second power supply is providing power to the server.
Off	On	Off	Faulty power supply	Replace the power supply.	
Off	On	On	Faulty power supply	Replace the power supply.	
On	Off	Off	Power supply not fully seated, faulty system board, or faulty power supply	1. Reseat the power supply. 2. If the system board error (fault) LED is not lit, replace the power supply. 3. If the system board error (fault) LED is lit, (Trained service technician only) replace the system board.	Typically indicates that a power supply is not fully seated.
On	Off or Flashing	On	Faulty power supply	Replace the power supply.	
On	On	Off	Normal operation		
On	On	On	Power supply is faulty but still operational	Replace the power supply.	

Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the integrated management module) is shut down; however, the server can respond to requests to the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

Turning on the server

Approximately 5 seconds after the server is connected to ac power, one or more fans might start running to provide cooling while the server is connected to power and the power-on button LED flashes quickly. Approximately 1 to 3 minutes after

the server is connected to ac power, the power-control button becomes active (the power-on LED flashes slowly). You can turn on the server by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN® feature, the Wake on LAN feature can turn on the server.

Note: When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured peripheral component interconnect (PCI) devices.

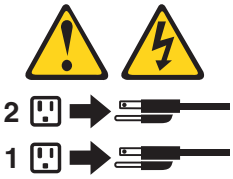
Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests to the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The server can be turned off by the Wake on LAN feature.
- The integrated management module (IMM) can turn off the server as an automatic response to a critical system failure.

Chapter 5. Installing and replacing optional devices

This chapter provides detailed instructions for installing optional hardware devices in the server.

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page vii, “Working inside the server with the power on” on page 30, “Handling static-sensitive devices” on page 31, and the guidelines in this section. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, do the following:
  1. Go to: http://www.lenovo.com/support.
  2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
  3. Select **Servers and Storage** from the **Brand** list.
  4. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
  5. Click **Downloads and drivers** to download firmware updates.
- Before you install optional hardware, make sure that the server is working correctly. If an operating system is installed, start the server, and make sure that the operating system starts. If no operating system is installed, make sure that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, refer to the *Hardware Maintenance Manual* for diagnostic information.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- To view the error LEDs on the system board and internal components, leave the server connected to power.
- You do not have to turn off the server to install or replace hot-swap fans, redundant hot-swap ac power supplies, or hot-plug Universal Serial Bus (USB)

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devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables or non-hot-swap optional devices or components.

- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see http://www.lenovo.com/thinkserver.
- When working inside the server, you might find some tasks easier if you lay the server on its side.

System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or an electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power-supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the left-side cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the left-side cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not remove the air duct or air baffles while the server is running. Operating the server without the air duct or air baffles might cause the microprocessor to overheat.
- Microprocessor socket 2 always contains either a microprocessor duct or a microprocessor and heat sink.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

The server supports hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

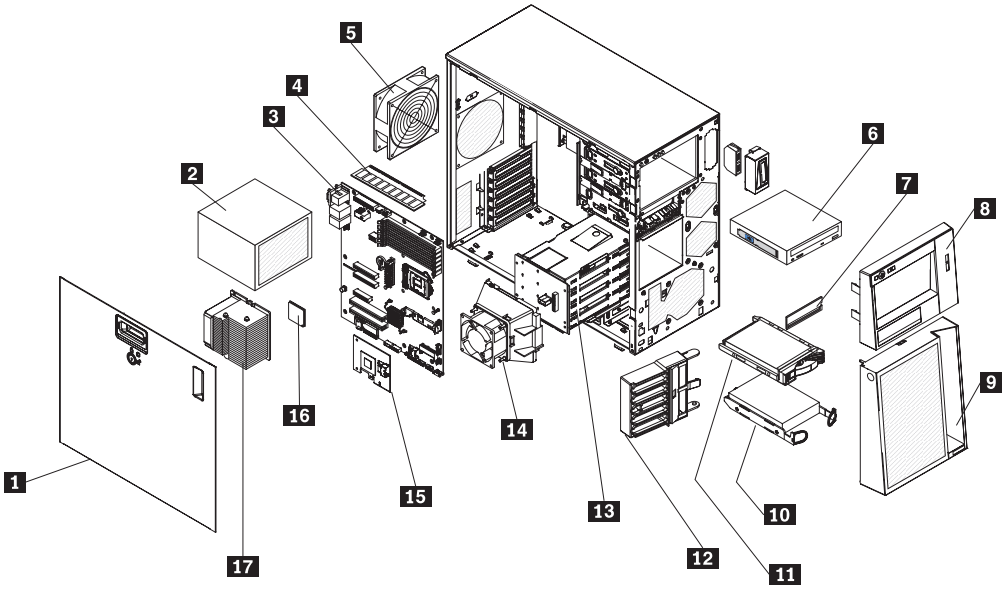
Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Wear an electrostatic-discharge wrist strap, if one is available.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Server components

The following illustration shows the major components in the server.



1	Cover	10	SATA hard disk drive (some models)
2	Non-hot-swap power supply	11	Hot-swap hard disk drive (some models)
3	System board	12	Front adapter-support bracket
4	DIMM	13	Drive cage
5	Rear system fan	14	Hard disk drive fan assembly
6	Optical drive	15	SAS/SATA connector
7	Filler panels	16	Microprocessor
8	Upper bezel	17	Heat sink
9	Lower bezel		

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

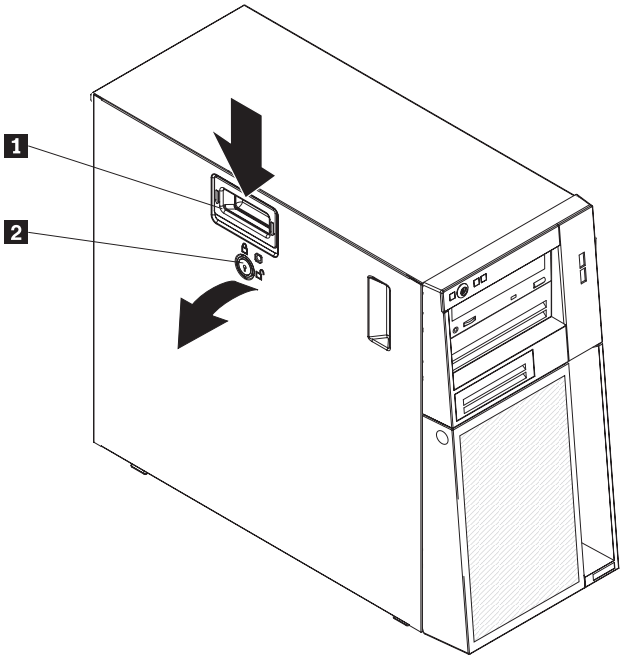
Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

To remove the server side cover, complete the following steps.

Attention: Operating the server for more than 30 minutes with the side cover removed might damage server components. For proper cooling and airflow, replace the side cover before turning on the server.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices (see “Turning off the server” on page 28); then, disconnect all power cords and external cables.
3. Unlock the side cover **2** ; then, press the cover-release latch down **1** ; then, remove the cover and set it aside.



To replace the side cover, see “Installing the side cover.”

Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Installing the side cover

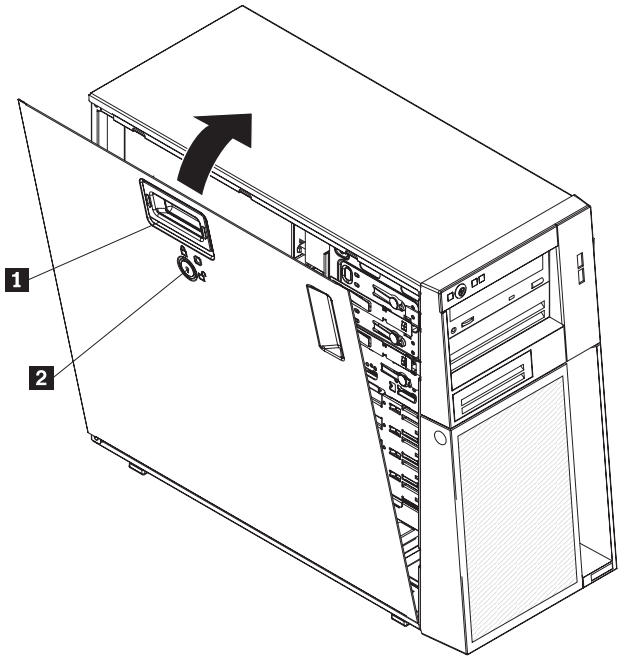
Attention: For proper cooling and airflow, replace the side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the side cover removed might damage server components.

To install the side cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. If you removed the upper and lower bezels, reinstall them before you replace the side cover (see “Installing the upper bezel” on page 37 and “Installing the lower bezel” on page 36).

   Important: The cover lock must be in the unlocked (opened) position before you install the side cover.

3. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis. Press down on the cover release latch and push the cover completely closed until it latches securely into place.



4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the two-piece bezel

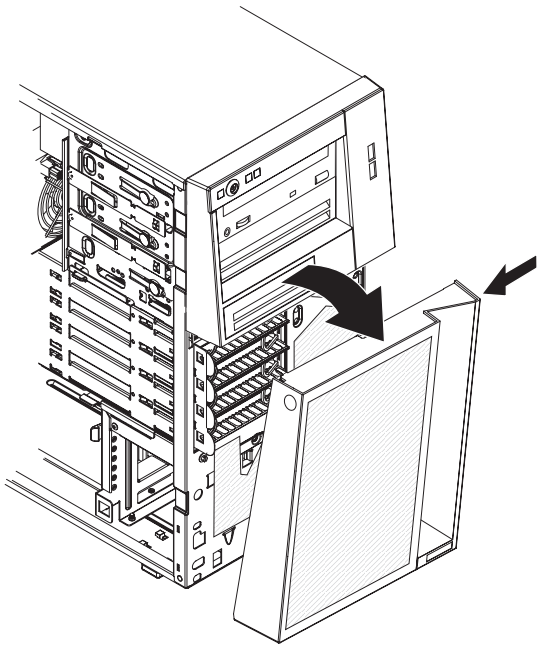
When you work with some devices, such as drives in bays 1 through 7 (see page 43), you must first remove the two-piece bezel to access the devices.

Note:

- Before you remove the upper bezel, you must unlock and remove the side cover and remove the lower bezel.
- If you are removing only the lower bezel, you do not have to remove the side cover. However, the side cover must be unlocked.

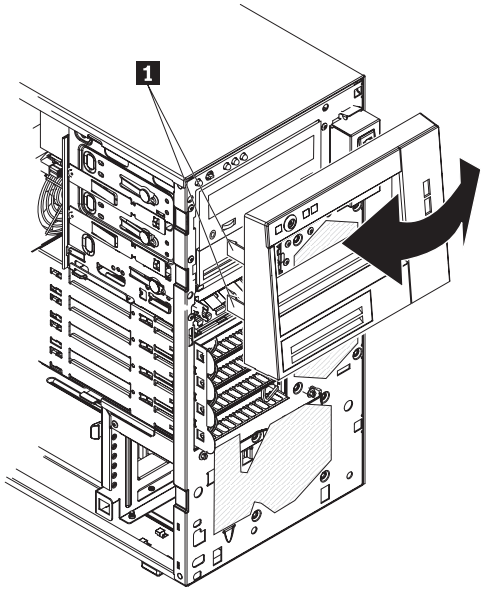
To remove the two-piece bezel, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Unlock the side cover.
3. Remove the side cover (see “Removing the side cover” on page 32).
4. Press the round blue release button on the right side of the lower bezel and tilt the lower bezel forward to disengage it from the chassis.



5. Lift the lower bezel to disengage the two bottom tabs from the chassis. Set the lower bezel aside.

6. Carefully pull the two bezel clips **1** on the left side of the upper bezel away from the chassis; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis. Set the upper bezel aside.

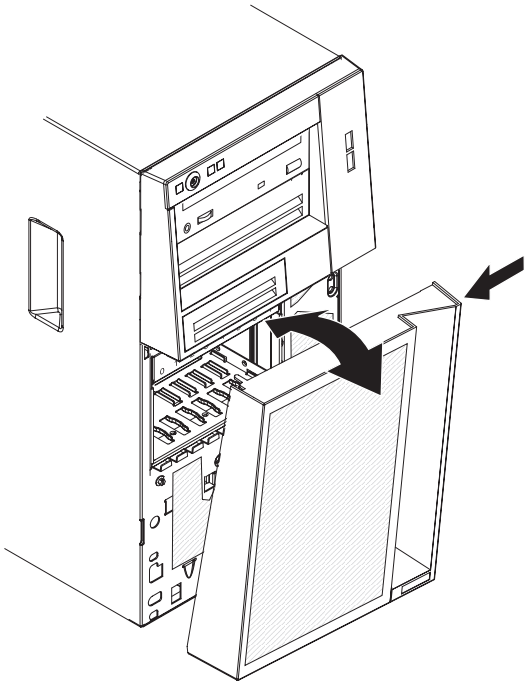


For instructions for replacing the two-piece bezel, see “Installing the lower bezel” and “Installing the upper bezel” on page 37.

Installing the lower bezel

To install the lower bezel, complete the following steps:

1. Insert the two bottom tabs on the lower bezel into the corresponding holes in the front of the chassis.

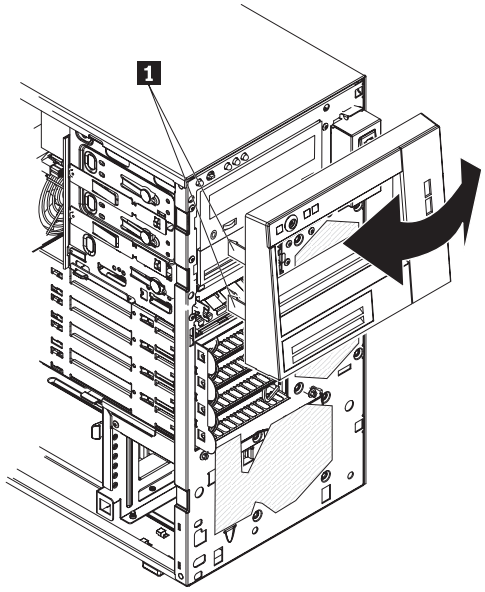


2. Rotate the top of the lower bezel up to the chassis; then, press the blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.
3. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the upper bezel

To install the upper bezel, complete the following steps:

1. Insert the two tabs on the right-side of the upper bezel into the corresponding holes on the right side of the chassis.



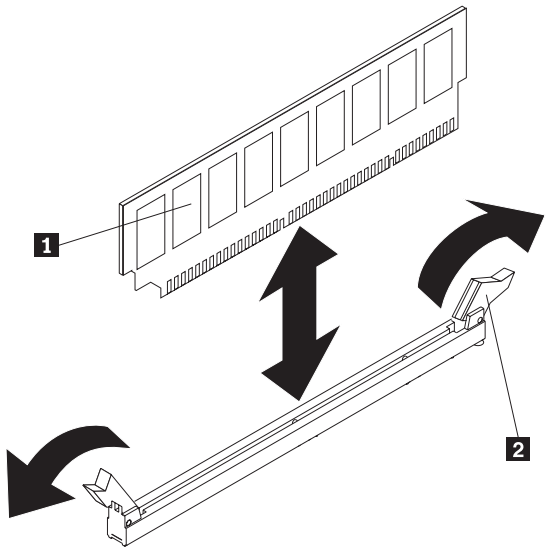
2. Rotate the upper bezel to the left side of the chassis until the bezel clips are aligned with the corresponding indentations on the left side of the chassis and it snaps into place.
3. Install the lower bezel (see “Installing the lower bezel” on page 36).
4. Install the side cover (see “Installing the side cover” on page 33).
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a memory module

To remove a dual inline memory module (DIMM), complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Locate the DIMM connector that contains the DIMM that is to be replaced (see “System-board internal connectors” on page 19 for DIMM slot locations).

   Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
5. Carefully open the retaining clips on each end **2** of the DIMM connector and remove the DIMM **1**.



6. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when you install DIMMs (see “System-board internal connectors” on page 19 for the location of the DIMM connectors):

- The server supports industry-standard, 1066 or 1333 MHz, PC3-10600R-999 (single-rank or dual-rank) double-data-rate 3 (DDR3), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). See http://www.lenovo.com/thinkserver and click the **Options** tab for a list of supported memory modules for the server.
- The maximum amount of memory that the server supports is dependent on the type of memory that you install in the server. See “Unbuffered DIMMs (UDIMMs)” on page 39 and “Registered DIMMs (RDIMMs)” on page 40 for more information.
- The amount of usable memory is reduced, depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see “Using the Setup Utility” on page 110.
- The maximum operating speed of the server is determined by the slowest DIMM in the server.
- If you install a pair of DIMMs in DIMM connectors 2 and 5, the size and speed of the DIMMs that you install in DIMM connectors 2 and 5 must match each other. How ever, they do not have to be the same size and speed as the DIMMs that are installed in DIMM connectors 1 and 4.
- You can use compatible DIMMs from various manufacturers in the same pair.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.
- The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

  *ggg e*Rx*ff*-PC3-*wwwwwm-aa-bb-cc*

where:

ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

e is the number of ranks

1 = single-rank

2 = dual-rank

4 = quad-rank

ff is the device organization (bit width)

4 = x4 organization (4 DQ lines per SDRAM)

8 = x8 organization

16 = x16 organization

wwwww is the DIMM bandwidth, in MBps

8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

m is the DIMM type

E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

R = Registered DIMM (RDIMM)

U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

aa is the CAS latency, in clocks at maximum operating frequency

bb is the JEDEC SPD Revision Encoding and Additions level

cc is the reference design file for the design of the DIMM

d is the revision number of the reference design of the DIMM

Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).

The following sections provide additional information specific to unbuffered and registered DIMMs that you must consider.

Unbuffered DIMMs (UDIMMs)

The following notes provide information that you must configure when you install UDIMMs:

- The memory channels run at the fastest common frequency of the installed DIMMs.
- Do not use both UDIMMs and RDIMMs in the same server.
- Using ECC and non-ECC UDIMMs in the server will cause the server to run in non-ECC mode.
- The UDIMM options that are available for the server are 1 GB, 2 GB, and 4 GB (when available) memory DIMMs.
- You can install a maximum of 16 GB of memory in some server models when you use UDIMMs.
- The server supports up to two single-rank or dual-rank UDIMMs per channel.
- DIMM slots 3 and 6 are not supported when you install UDIMMs in the server. Do not install DIMMs in these connectors.

- The following table lists the supported UDIMM population.

Table 6. Supported UDIMM population per channel

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
2	1	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank
2	2	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank

- The following table lists the maximum DIMM population using ranked UDIMM.

Table 7. Maximum memory population using ranked UDIMMs (depending on your model)

Number of UDIMMs	DIMM type	DIMM size	Total memory
4	single-rank UDIMMs	1 GB	4 GB
4	single-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	4 GB (when available)	16 GB

- The following table lists the UDIMM memory population rule to optimize the system performance.

Table 8. UDIMMs population rule for dual-channel symmetric mode

DIMMs connector 1	DIMMs connector 2	DIMMs connector 3	DIMMs connector 4	DIMMs connector 5	DIMMs connector 6
populated	empty	empty	empty	empty	empty
populated	empty	empty	populated	empty	empty
populated	populated	empty	populated	populated	empty

Registered DIMMs (RDIMMs)

The following notes provide information that you must consider when you install RDIMMs:

- The memory channels run at the fastest common frequency of the installed DIMMs.
- Do not use both RDIMMs and UDIMMs in the same server.
- The server supports up to three single-rank, dual-rank, or quad-rank RDIMMs per channel.
- The RDIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available) memory DIMMs.
- You can install a maximum of 32 GB of memory in the server when you use RDIMMs.

- The following table lists the supported RDIMM population.

Table 9. Supported RDIMM population per channel

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
3	1	Registered DDR3 ECC	1066, 1333	single-rank, dual-rank
3	2	Registered DDR3 ECC	1066, 1333	single-rank, dual-rank
3	3	Registered DDR3 ECC	800	single-rank, dual-rank
3	1	Registered DDR3 ECC	1066	quad-rank
3	2	Registered DDR3 ECC	800	quad-rank

- The following table lists the maximum DIMM population using ranked RDIMM.

Table 10. Maximum memory population using ranked RDIMMs (depending on your model)

Number of RDIMMs	DIMM type	DIMM size	Total memory
6	single-rank RDIMMs	1 GB	6 GB
6	single-rank RDIMMs	2 GB	12 GB
6	dual-rank RDIMMs	2 GB	12 GB
4	dual-rank RDIMMs	4 GB	16 GB
4	quad-rank RDIMMs	4 GB	16 GB
6	dual-rank RDIMMs	4 GB	24 GB
4	quad-rank RDIMMs	8 GB (when available)	32 GB

- The following table lists the RDIMM memory population rule to optimize the system performance.

Table 11. RDIMMs population rule for dual-channel symmetric mode

DIMMs connector 1	DIMMs connector 2	DIMMs connector 3	DIMMs connector 4	DIMMs connector 5	DIMMs connector 6
populated	empty	empty	empty	empty	empty
populated	empty	empty	populated	empty	empty
populated	populated	empty	populated	populated	empty
populated	populated	populated	populated	populated	populated

See “System-board internal connectors” on page 19 for the location of the DIMM connectors on the system board.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, complete the following steps:

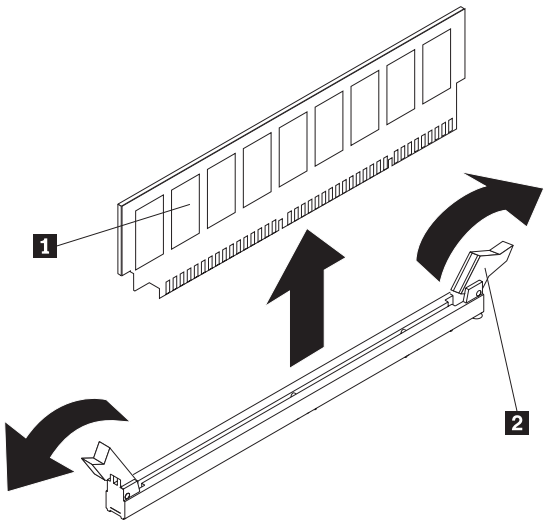
1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see “Removing the side cover” on page 32).
4. Locate the DIMM connectors on the system board. Determine the connectors into which you will install the DIMMs. Install the DIMMs in the sequence shown in the following table.

Table 12. DIMM installation sequence

Number of DIMMs	Installation sequence (connectors)
First pair of DIMMs	1, 4
Second pair of DIMMs	2, 5
Third pair of DIMMs	3, 6

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

5. Open the retaining clip on each end of the DIMM connector.



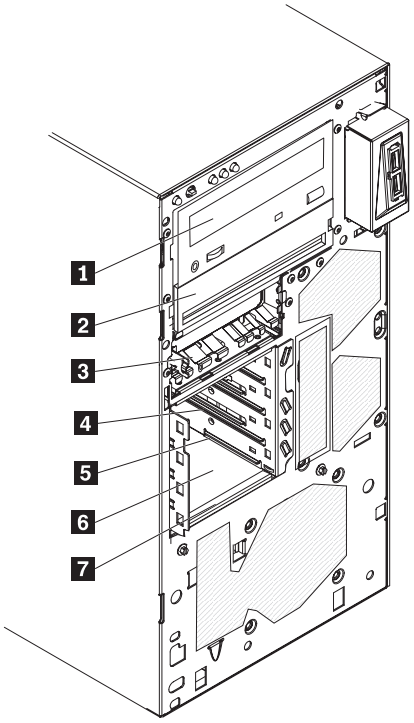
6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
7. Turn the DIMM so that the DIMM keys align correctly with the connector.
8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see “System-board internal connectors” on page 19 for the location of the DIMM connectors).
9. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

   Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

If you have other devices to install or remove, do so now; otherwise, go to “Completing the installation” on page 67.

Removing and installing internal drives

See “Specifications” on page 10 for information about the types of drives that the server supports and other important information. The following figure shows the locations of the drive bays (**1** - **7**) in the server.



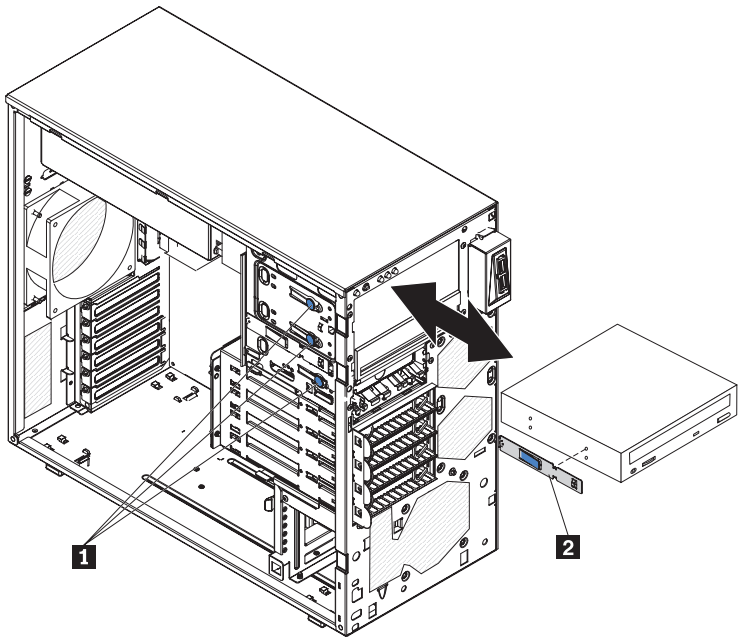
The following notes describe the types of drives that the server supports and other information that you must consider when installing a drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional internal or external USB diskette drives, tape drives, DVD-ROM, and multiburner drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- The SATA removable-media drives that you install in bay 1 connects to the SATA 4 connector on the system board and the drive in bay 2 connects to the SATA 5 connector on the system board.
- To install a 3.5-inch drive in a 5.25-inch bay, you must use the 5.25-inch conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- See http://www.lenovo.com/thinkserver and click the **Options** tab for a list of supported options.

Removing a DVD drive

To remove a DVD drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 34).
5. Disconnect the power and signal cables from the drive that is to be removed.
6. Press and hold the blue release button on the side of the bay to release the drive; then, pull the drive out of the front of the server.



1 Release buttons
2 Drive retainer clip

7. Remove the drive retainer clip from the side of the drive. Save the clip to use when you install the replacement drive.
8. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a DVD drive

To install a DVD drive, complete the following steps:

1. If you are replacing a removed drive with a new drive, make sure that:
   - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
   - You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.
   - You have removed the blue optical drive rails from the side of the old drive and have them available for installation on the new drive.

   Note: If you are installing a drive that contains a laser, observe the following safety precaution.

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

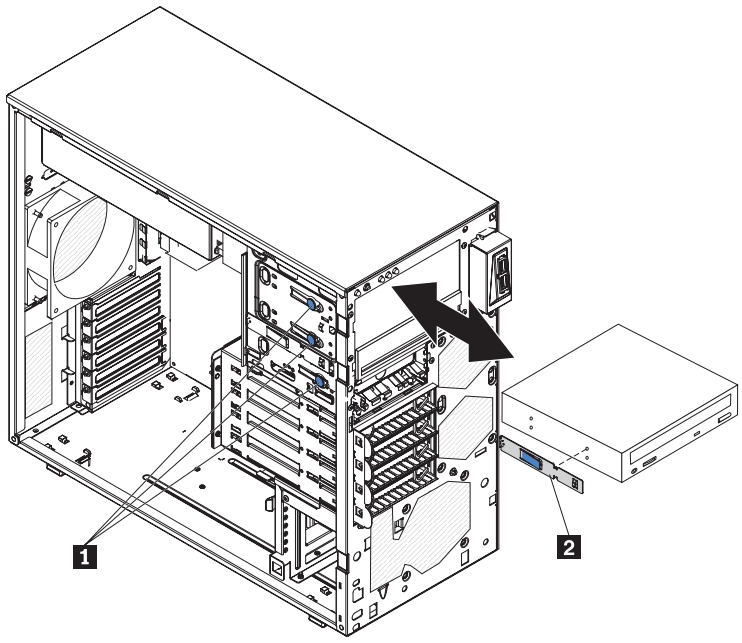
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

2. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
3. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

   Note: You might find it easier to install the new drive from the front and then attach the cables.
4. If you are installing a 3.5-inch drive in bay 2, attach a 5.25-inch conversion kit to the 3.5-inch drive. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



1 Release buttons
2 Drive retainer clip

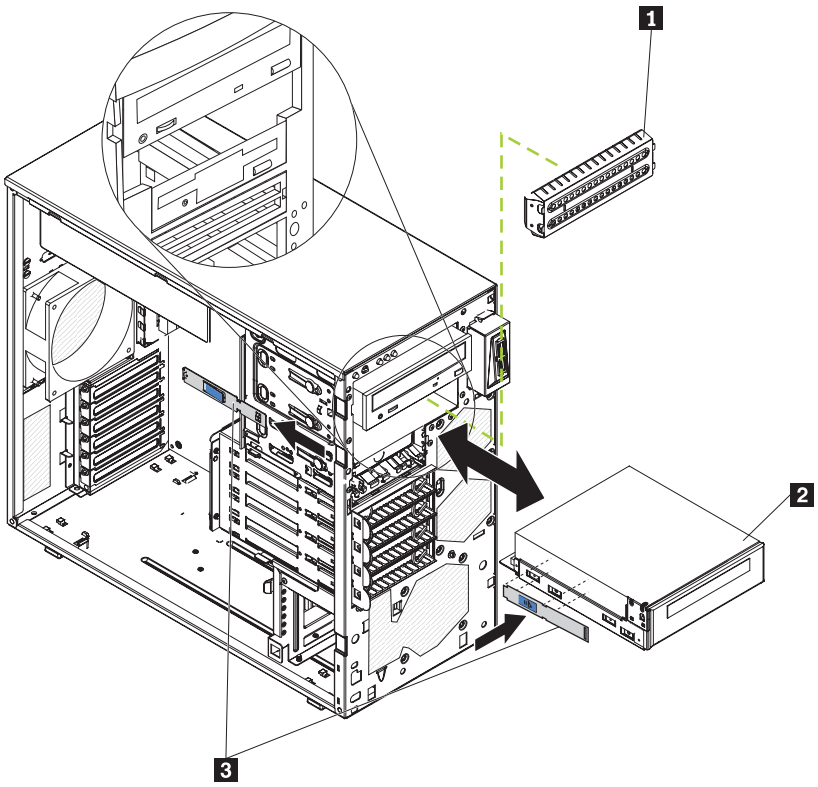
5. Push the drive into the bay.
6. Connect the power and signal cables to the drive.

   Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
7. Install the upper bezel (see “Installing the upper bezel” on page 37).
8. Install the lower bezel (see “Installing the lower bezel” on page 36).
9. Install and lock the side cover (see “Installing the side cover” on page 33).
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a tape drive

To remove a tape drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Installing the side cover” on page 33).
4. Remove the lower bezel (see “Installing the lower bezel” on page 36).
5. Remove the upper bezel (see “Installing the upper bezel” on page 37).
6. Disconnect the power and signal cables from the drive that is to be removed.
7. Press and hold the blue release button on the side of the bay to release the drive; then, pull the drive out of the front of the server.
8. Remove the drive retainer clip from the side of the drive. Save the clip to use when you install the replacement drive.



1 EMC shield
2 Tape drive
3 Drive retainer clip

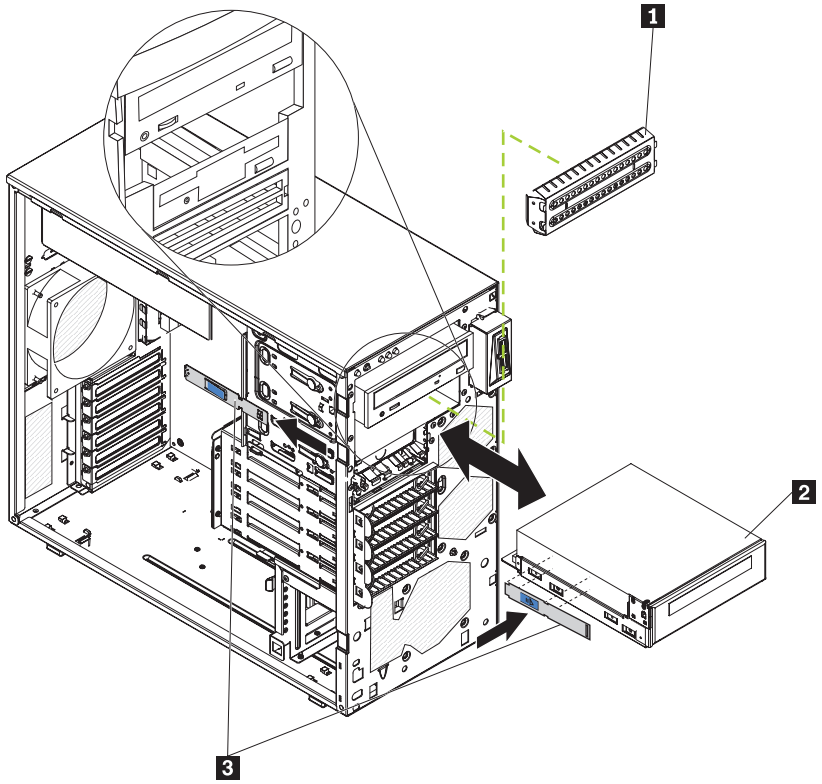
9. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a tape drive

To install a tape drive, complete the following steps:

1. If you are replacing a removed drive with a new drive, make sure that:
   - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
   - You check the instructions that come with the new drive to determine whether you must set any switches or jumpers on the drive.
   - You have removed the drive retainer clip on the side of the old drive and have it available for installation on the new drive.
2. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
3. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
4. Unlock and remove the side cover (see “Installing the side cover” on page 33).
5. Remove the lower bezel (see “Installing the lower bezel” on page 36).
6. Remove the upper bezel (see “Installing the upper bezel” on page 37).
7. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
9. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



1 EMC shield
2 Tape drive
3 Drive retainer clip

10. Remove the EMC filler.
11. Push the drive into the bay.

    Note: A tape drive can be installed in bay 1 or bay 2
12. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board.
13. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
14. If you have another drive to install or remove, do so now.
15. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.

Removing a hot-swap hard disk drive

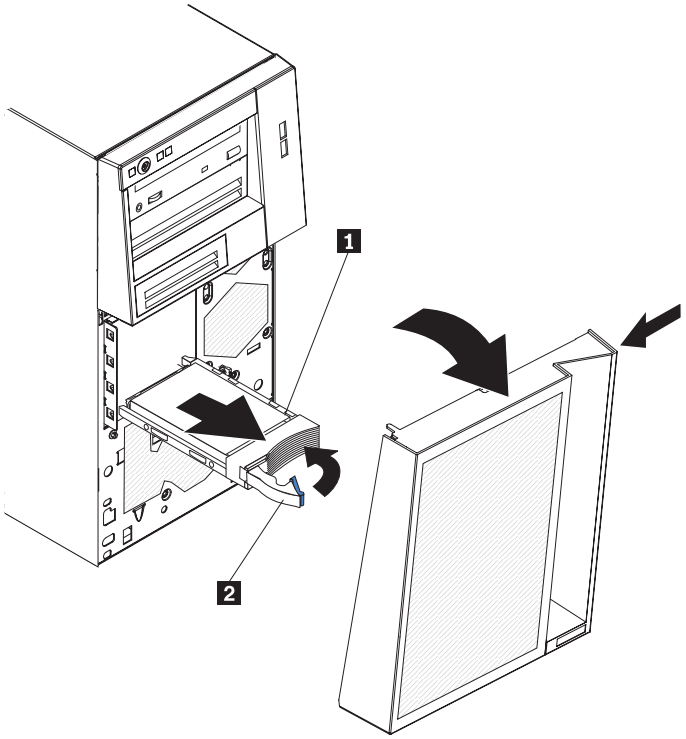
This procedure applies only to server models that have hot-swap hard disk drives.

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.

   Note: You do not have to turn off the server to remove hot-swap drives from the hot-swap drive bays.
2. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
3. Rotate the drive tray handle of the drive assembly that is to be removed to the open position (based on your model).



1 Drive-tray assembly
2 Drive tray handle (in open position)

4. Grasp the handle of the drive assembly that is to be replaced and pull the assembly out of the bay.
5. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

IDs for hot-swap hard disk drives

On some models, the hot-swap-drive backplane controls the IDs of the internal hot-swap drive bays. The following table lists the IDs of the hard disk drives and backplane that are connected to one channel in the hot-swap models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A. This table applies only to server models that support four hard disk drives.

Table 13. IDs of the hot-swap drives (models with four drive bays)

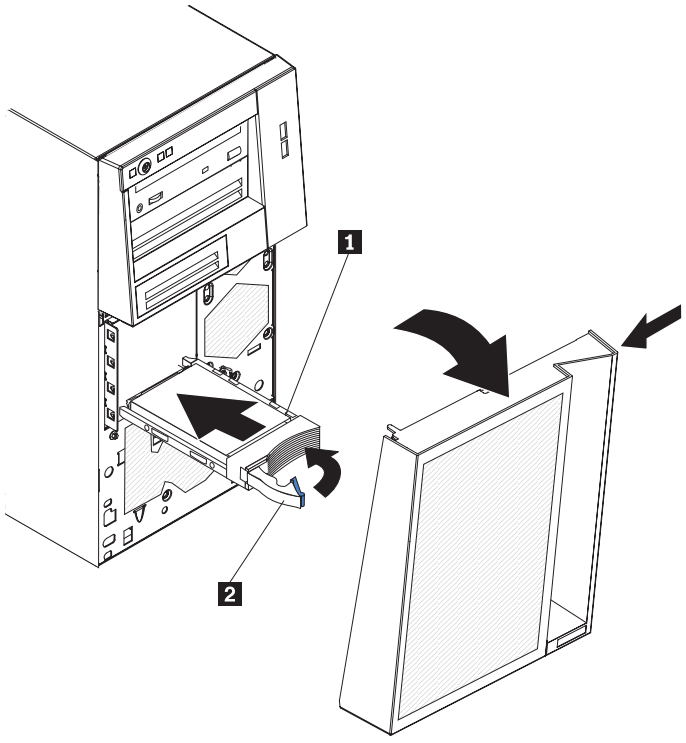
Drive bay	ID
4	0
5	1
6	2
7	3

Installing a hot-swap hard disk drive

This procedure applies only to server models that have hot-swap hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; the two types cannot be combined.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- See “Removing and installing internal drives” on page 43 for additional information.

To install a hot-swap hard disk drive (based on your model), complete the following steps.



1. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
2. Make sure that the drive tray handle is in the open position.
3. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly **1** into the drive bay until the drive stops.
4. Rotate the drive tray handle to the closed position **2** .
5. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server for the drive to be recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

   Note: If the server is configured for RAID operation using a ServeRAID controller, you might have to reconfigure the disk arrays after you replace hard disk drives. See the ServeRAID documentation for additional information about RAID operation.
6. Install the lower bezel (see “Installing the lower bezel” on page 36).
7. Lock the side cover.

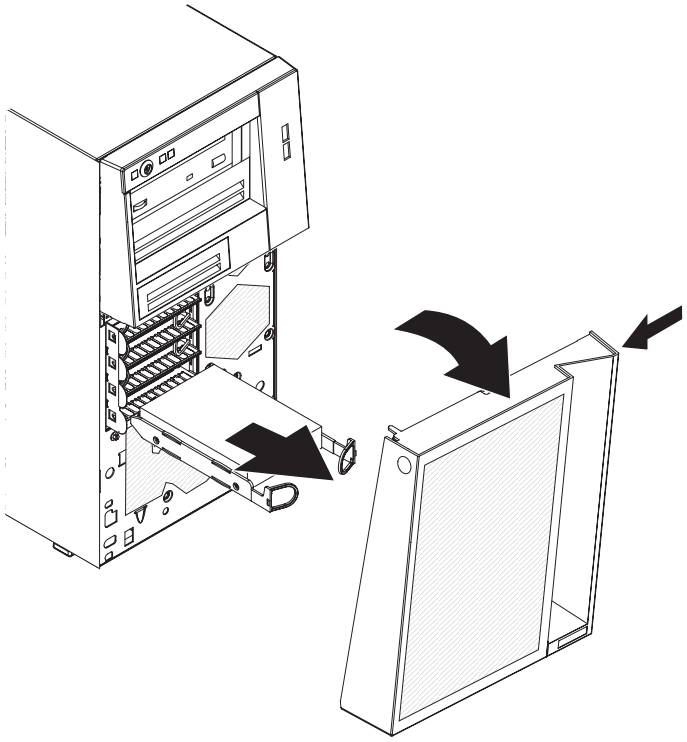
Removing a simple-swap hard disk drive

This procedure applies only to server models that have simple-swap SATA hard disk drives.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before you remove or install a simple-swap hard disk drive.

To remove a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
4. Pull the loops of the drive assembly that is to be removed toward each other; then, pull the assembly out of the bay.



5. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

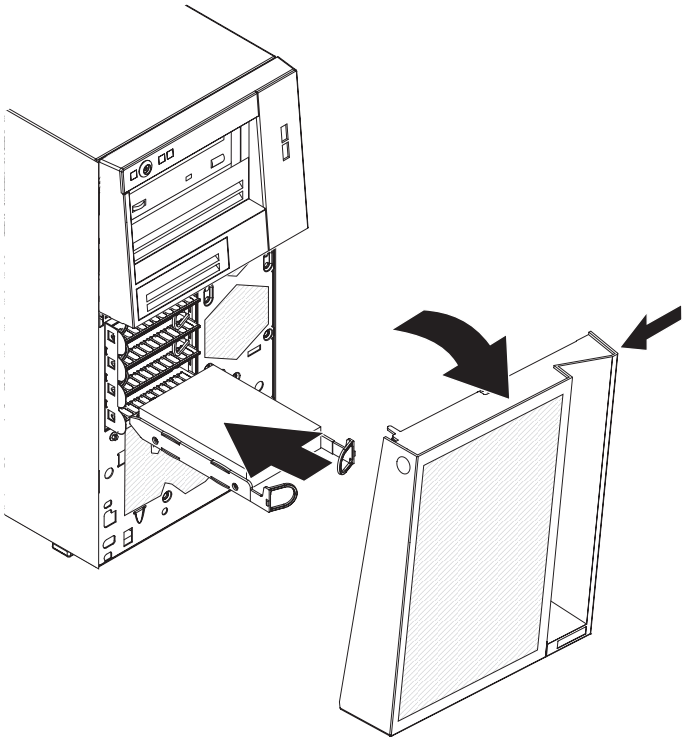
Installing a simple-swap hard disk drive

This procedure applies only to server models that have simple-swap SATA hard disk drives.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server you remove or install a simple-swap hard disk drive.

To install a simple-swap hard disk drive, complete the following steps:

1. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
2. Align the drive assembly with the guide rails in the bay.



3. Pull the loops of the drive assembly toward each other; then, carefully slide the drive assembly into the drive bay until it clicks into place, and release the loops.

   Note: Do not release the loops on the drive assembly until it is completely seated.
4. Install the lower bezel (see “Installing the lower bezel” on page 36).
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Power and signal cables for internal drives

The server uses cables to connect SATA attached, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See “System-board internal connectors” on page 19 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board or a compatible adapter or controller that you have installed.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the ends of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect SATA attached, SATA and SAS to the system board. Two or three types of signal cables come with the server:
  - **SATA attached (for optical drives):** The flat SATA-attached signal cable has two connectors. One of these connectors is attached to the optical drive, and one is attached to one of the connectors on the system board.
  - **Simple-swap SATA:** Simple-swap SATA models come with four SATA cables that are already connected to the system board and the backplate at the rear of the simple-swap drive cage.
  - **Hot-swap SAS/SATA:** Hot-swap SAS/SATA models come with one or two (depending on the model) data cables that connect the SAS/SATA controller to the hot-swap backplane. The data cable provides inherent connectivity for the SAS or SATA drives that the server supports. Therefore, additional cabling is not required for these drives.

For more information about the requirements for SAS/SATA cables and connecting SAS/SATA devices, see the documentation that comes with these devices.

See http://www.lenovo.com/thinkserver and click the **Options** tab for a list of supported options.

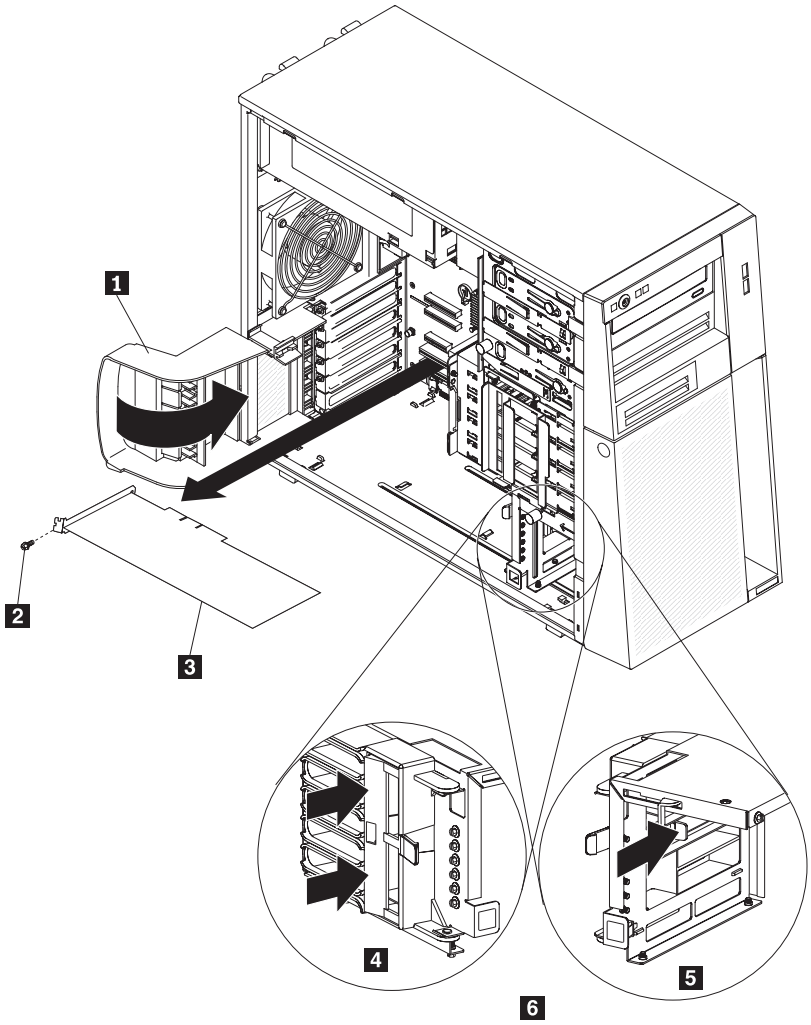
Removing an adapter

To remove an adapter, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Disconnect any cables from the adapter or any cables that impede access to the adapter.
5. Open the rear retention bracket **1** .
6. If you are removing a full-length adapter, press on the retaining tab (two blue pull points) on the left side of the front adapter-retention bracket until the release lever on the right side of the bracket clicks into place.

7. Remove the expansion-slot screw **2** at the rear of the adapter **3** if any.
8. Carefully grasp the adapter by its top edge or upper corners. And pull the adapter from the server.

   Attention: Expansion-slot covers must be installed in all empty slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.



1 Rear adapter retention bracket
2 Expansion-slot screw (Optional)
3 Adapter
4 Left side of front adapter retention bracket
5 Right side of front adapter retention bracket
6 Front adapter retention bracket

9. If you are not replacing the adapter, install an expansion-slot cover in the expansion-slot opening.
10. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter. Adapter that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors or slots:
  - Slot 1, PCIe2 x8 (x8, x4, x1) 25W
  - Slot 2, PCIe2 x8 (x8, x4, x1) 25W
  - Slot 3, PCIe2 x1 10W
  - Slot 4, PCI 32bit, 33MHz
  - Slot 5, PCI 32bit, 33MHz
- Some server models come with a ServeRAID-BR10il SAS/SATA RAID controller installed. The ServeRAID-BR10il controller enables integrated RAID levels-0 and level-1.
- You can install full-length adapters that are included in the supported options list in slots 1 through 5 (depending on your model).
- The 32-bit slots 4 and 5 support 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- The server scans PCI Express Gen 2 x8 (x8) slot 1, PCI Express Gen 2 x8 (x8) slot 2, PCI Express Gen 2 x4 (x4) slot 3, and PCI slots 4 and 5 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI Express Gen 2 x8 (x8) slot 1, PCI Express Gen 2 x8 (x8) slot 2, PCI Express Gen 2 x4 (x4) slot 3, PCI slot 4, and PCI slot 5.
- See http://www.lenovo.com/thinkserver and click the **Options** tab for a list of supported options.

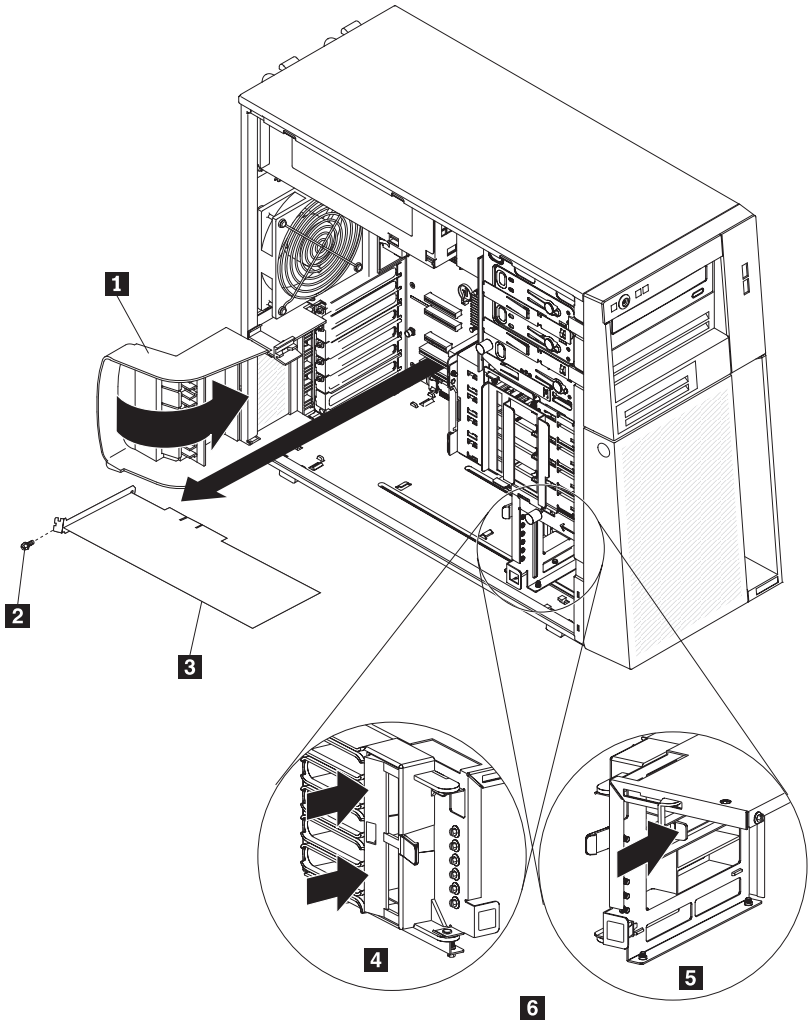
To install an adapter, complete the following steps.

Note: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 32.
3. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
4. Follow the instructions that come with the adapter to set jumpers or switches, if any.
5. Rotate the rear adapter-retention bracket to the open position and remove it from the server.

6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

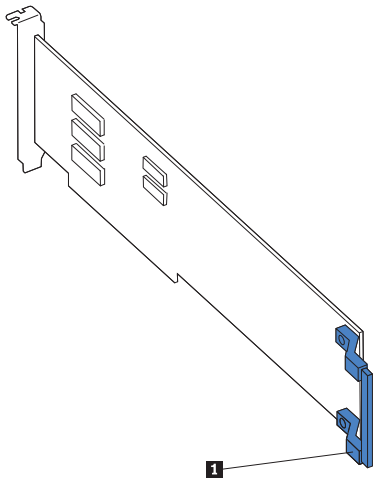
   Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.



1 Rear adapter retention bracket
2 Expansion-slot screw (optional)
3 Adapter
4 Left side
5 Right side
6 Front adapter retention bracket

7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.

8. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



1 Adapter guide

9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

   Attention: Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.
10. Install an expansion-slot screw at the rear of the adapter.
11. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.
12. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
13. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed position.

    Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws.

If you have other devices to install or remove, do so now; otherwise, go to “Completing the installation” on page 67.

Removing a PCI card

To remove a PCI card, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 32).
3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
4. Disconnect any cables connected to the adapter.

Attention: To avoid breaking the retaining clips or damaging the adapter connector, open and close the clips gently.

5. Carefully grasp the end of the adapter and pull it out of the connector.
6. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a PCI card

A PCI card can be installed in either PCI slot 1 or 2 on the system board. The PCI card is supported on hot-swap server models only. The PCI card enables integrated RAID levels 0, 1, 5, 6, and 10 support capability on hot-swap hard disk drives. For configuration information, see the documentation that comes with the adapter.

Important: To ensure that your PCI card functions properly on UEFI-based servers, make sure that the adapter firmware level is updated and the supporting drivers are installed.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To install the PCI card, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.

   Attention: To avoid breaking the retaining clips or damaging the PCI card connector, open and close the clips gently.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the hard disk drive fan assembly:
   a. Rotate the hard disk drive fan assembly cable out of the system board.
   b. Remove all hard disk drives.
   c. Press and hold the drive cage release tab on the side of the drive cage; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
   d. Pull out on the hard disk drive fan assembly release tabs (at the blue dots); then, rotate the hard disk drive fan assembly away from the drive cage slightly.
5. Disconnect the signal and power cables and the existing SAS/SATA controller (if one is installed); then, remove the controller from the server.
6. Touch the static-protective package that contains the PCI card to any unpainted metal surface on the server. Then, remove the PCI card from the package.
7. Align the PCI card so that the keys align correctly with the connector on the system board.

   Attention: Incomplete insertion might cause damage to the system board or the PCI card.

   Note: The drive cage should be in the open position. This illustration shows it in the closed position.
8. Press the PCI card firmly into the connector on the system board.

9. Take the other end of the signal cable that is attached to the drive backplane section for drive bays 0 through 3 (as labeled on the front of the drive cage) and connect it to the connector that is closest to the battery on the PCI card.
10. Replace the hard disk drive fan assembly:
    a. Insert the hard disk drive fan assembly retaining tab over the right edge of the hard disk drive backplane; then, rotate the hard disk drive fan assembly toward the backplane. Do not fully close the hard disk drive fan assembly.
    b. Route the signal cables and power cable through the slot on the edge of the hard disk drive fan assembly. Make sure that the cables will not be pinched between the hard disk drive fan assembly and the hard disk drive backplane when the assembly is installed.
    c. Rotate the hard disk drive fan assembly toward the backplane until the release tabs are fully engaged and snap into place.
11. Reconnect the hard disk drive fan assembly cable to the system board.
12. Rotate the drive cage back into the server until it stops; then, press and hold the retaining tab on top of the drive cage while you rotate the drive cage into the chassis until it is in the closed position.
13. Reinstall the hard disk drives.

    Note: Before you continue, check all internal power cables to make sure that they are connected to the system board and other optional devices.
14. Replace the side cover (see “Installing the side cover” on page 33). Go to “Completing the installation” on page 67.
15. Lock the side cover.
16. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a USB embedded hypervisor flash device

To remove the virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Unlock the USB retaining latch by squeezing the two retaining clips toward each other. Then, lift up the bracket cover.
5. Grasp the flash device and pull to remove it from the connector.
6. Press down on the retaining latch to return it to the original position.
7. If you are instructed to return the flash device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a USB embedded hypervisor flash device

To install the virtual media key, complete the following steps:

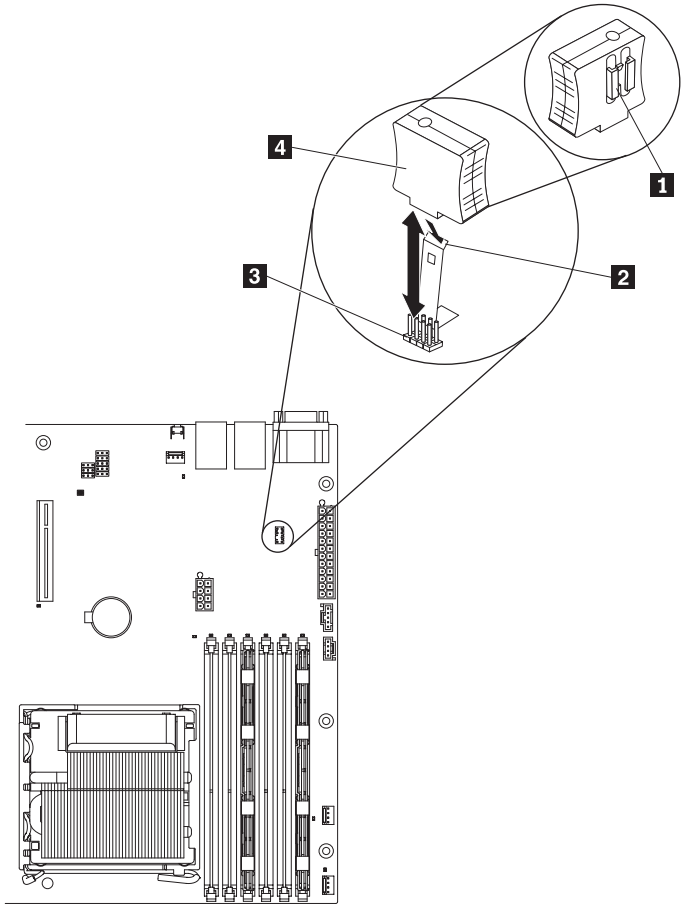
1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Unlock the USB retaining latch by squeezing the two retaining clips toward each other.

5. Align the flash device with the connector on the system board and push it into the connector until it is firmly seated.
6. Press down on the retaining latch to lock the flash device into the USB connector.
7. Reconnect the power cord and any cables that you removed.
8. Install and lock the side cover (see “Installing the side cover” on page 33).
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

Removing the virtual media key

To remove the virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the side cover (see “Removing the side cover” on page 32).
3. Grasp the virtual media key and gently slide it up and off of the mounting tab.



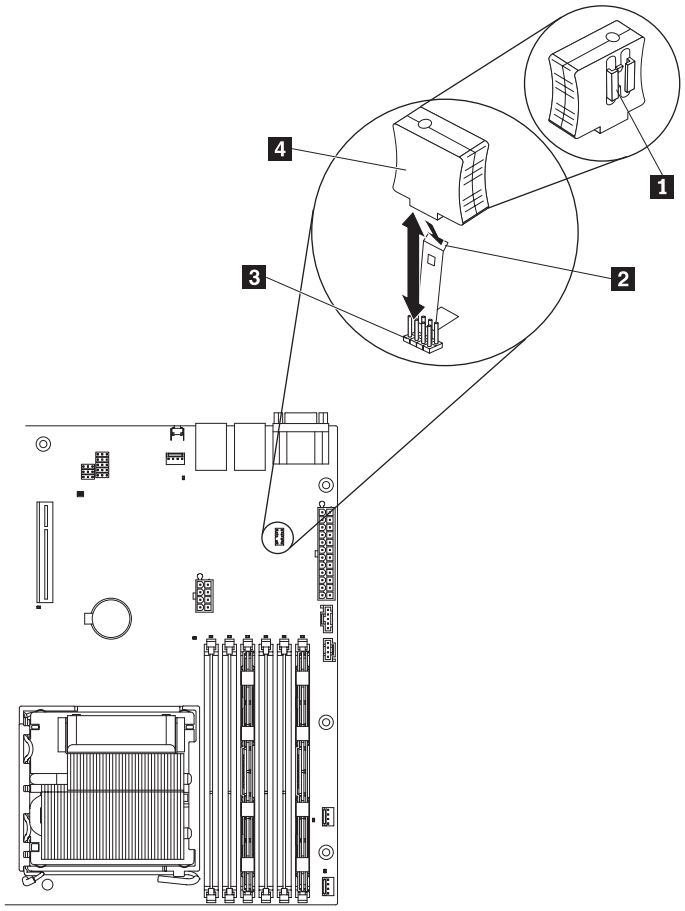
1 Mounting bracket (feet)
2 Mounting tab
3 Virtual media key connector
4 Virtual media key (front)

4. If you are instructed to return the virtual media key, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the virtual media key

To install the virtual media key, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Unlock and remove the side cover (see “Removing the side cover” on page 32).
3. Align the virtual media key with the mounting tab and slide it down the tab onto the connector on the system board. Press the virtual media key down into the connector until it is firmly seated on the system board.



1 Mounting bracket (rear)
2 Mounting tab
3 Virtual media key connector
4 Virtual media key (front)

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 67.

Removing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies. See “Installing a non-hot-swap power supply” on page 98 for information about the removal of a non-hot-swap power supply.

When you remove or install a hot-swap power supply, observe the following precautions.

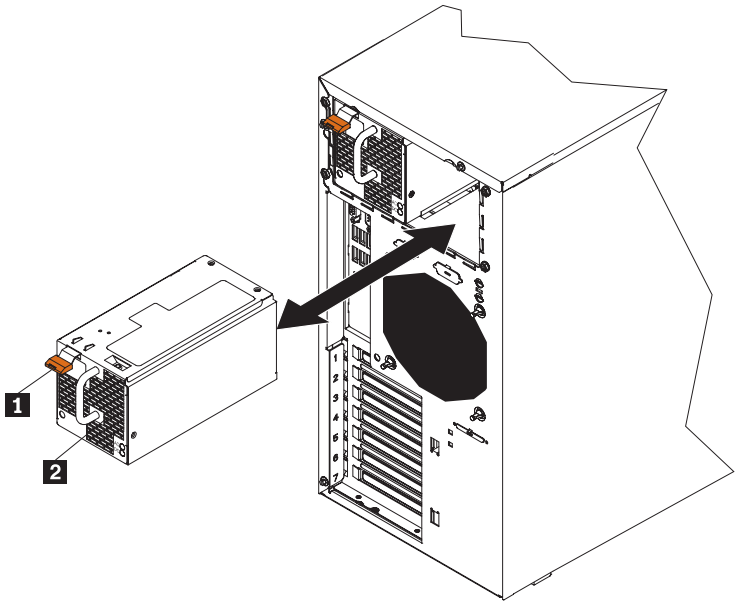
Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

To remove a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Disconnect the power cord from the power supply that is to be removed.
3. Press down on the release lever **1** and pull the power supply **2** out of the bay, using the handle.



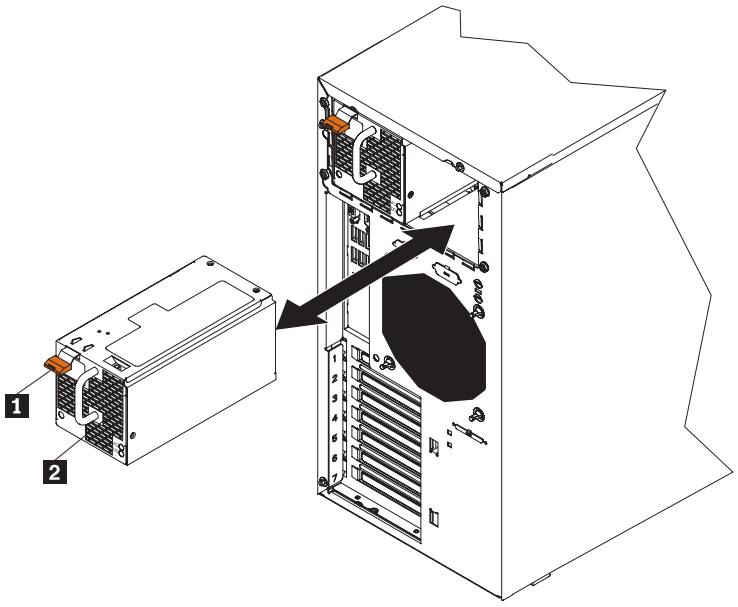
4. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies. See “Installing a non-hot-swap power supply” on page 98 for information about the installation of a non-hot-swap power supply.

To install a hot-swap power supply, complete the following steps:

1. Place the power supply into the bay guides.



1 Release lever
2 Hot-swap power supply

2. Using the handle, push the power supply toward the front of the chassis until it locks into place.
3. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
4. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.

Installing a security rope clip

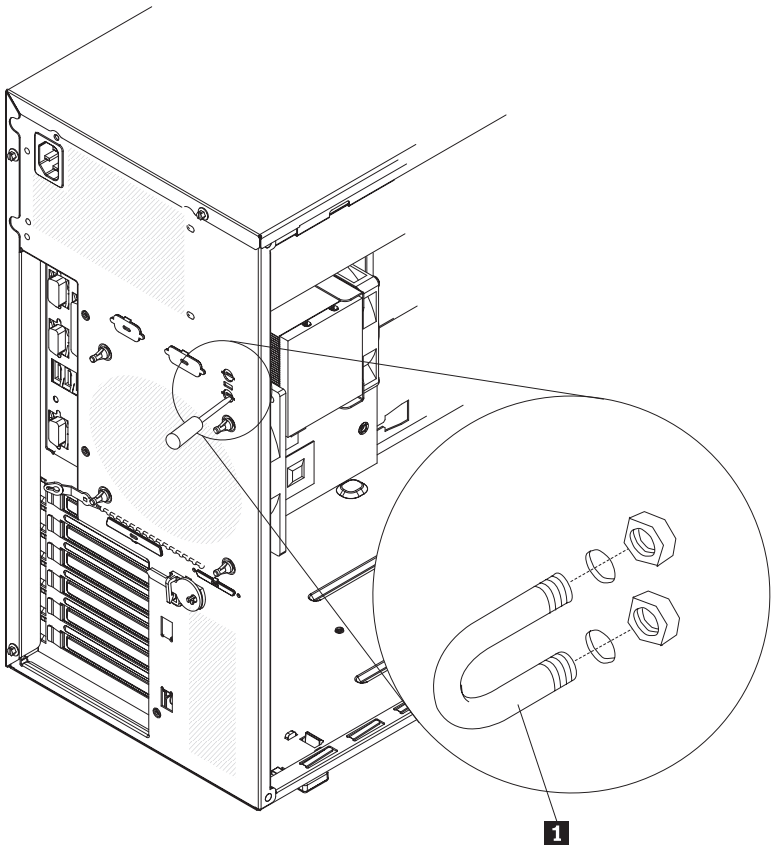
To help prevent hardware theft, you can add a security rope clip and cable to the server. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

Before you begin, obtain the following items:

- A flat-blade screwdriver
- An adjustable wrench
- A 19 mm (0.75 in.) rope clip or wire rope (similar to National Manufacturing number 3230, stock number 176-735)
- Threaded nuts that fit the rope clip
- A security cable
- A lock, such as a combination lock or padlock

To install a rope clip 1, complete the following steps:

1. Turn off the server and all attached devices. Disconnect all external cables and power cords.
2. Use a screwdriver to remove the two metal knockouts.
3. Insert the rope clip through the rear panel; then, attach and tighten the nuts.



4. Thread the cable through the rope clip and around an object that is not part of or permanently secured to the building structure or foundation, and from which the cable cannot be removed. Fasten the cable ends together with a lock. After you add the security cable, make sure that it does not interfere with other cables that are connected to the server.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation."

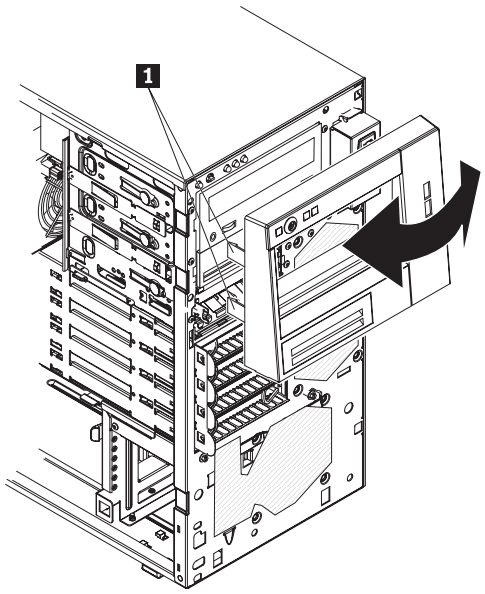
Completing the installation

To complete the installation, you must reinstall the two-piece bezel, reinstall the side cover, connect all the cables and, for some devices, run the Setup utility. Follow the instructions in this section.

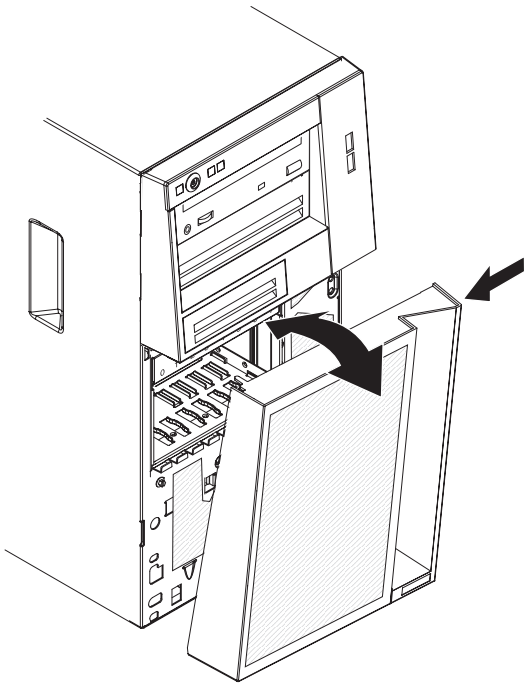
Reinstalling the two-piece bezel

To reinstall the two-piece bezel, complete the following steps:

1. Install the upper bezel on the front of the server chassis:
   a. Insert the two right-side tabs on the upper bezel into the matching holes on the right side of the chassis.
   b. Rotate the upper bezel to the left side of the chassis and press the bezel clips into the matching indentations on the left side of the chassis until the bezel clips snap into place **1** .


1

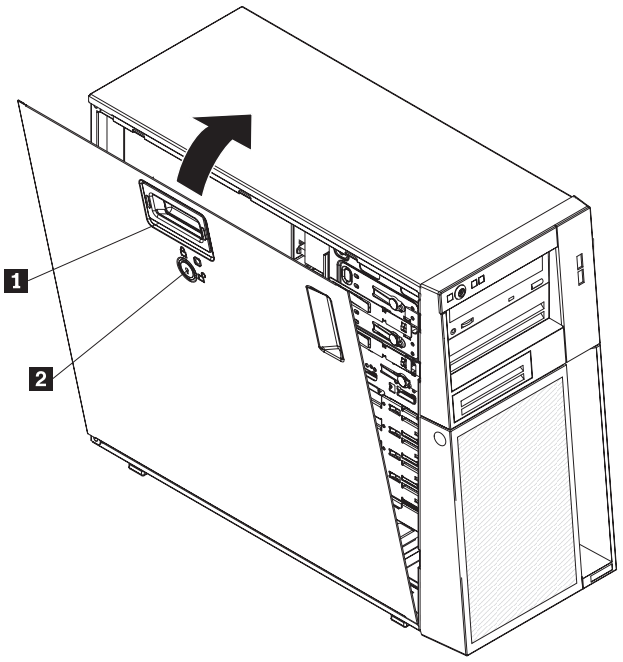
2. Install the lower bezel:
   a. Insert the two bottom tabs on the lower bezel into the matching holes in the front of the chassis.



   b. Rotate the top of the lower bezel up to the chassis; then, press the blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.

Reinstalling the side cover

If you removed the side cover, reinstall it.



Note: The rear adapter-retention bracket rests against the server side cover. You might find it easier to lay the server on its side to replace the side cover.

To reinstall the side cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.

   Note: The cover-release latch **1** must be in the unlocked (opened) position before you install the side cover.
2. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis, and then press down on the cover release latch and push the cover completely closed until it latches securely into place.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock **2** the side cover.

   Note: When you lock the server side cover, it locks both the cover and the bezel.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

See “Rear view” on page 18 for an illustration of the input/output (I/O) connectors on the rear of the server.

Updating the server configuration

When you start the server for the first time after you add or remove a device, you might receive a message that the configuration has changed. The Setup Utility starts automatically so that you can save the new configuration settings. For more information, see Chapter 7, “Configuring the server,” on page 109.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

The server comes with at least one microprocessor. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see the operating-system documentation.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 122.

Connecting external devices

If you install a supported optional adapter, you can attach external devices to the server.

To attach an external device, complete the following steps:

1. Read the safety information that begins on page vii, “Installation guidelines” on page 29, and the documentation that comes with the device.
2. Turn off the server and all attached devices.
3. Follow the instructions that come with the device to prepare it for installation and to connect it to the server.

Note: If you are attaching an external device, see the documentation that comes with the device for information about cabling.

Chapter 6. Installing and replacing customer replaceable units

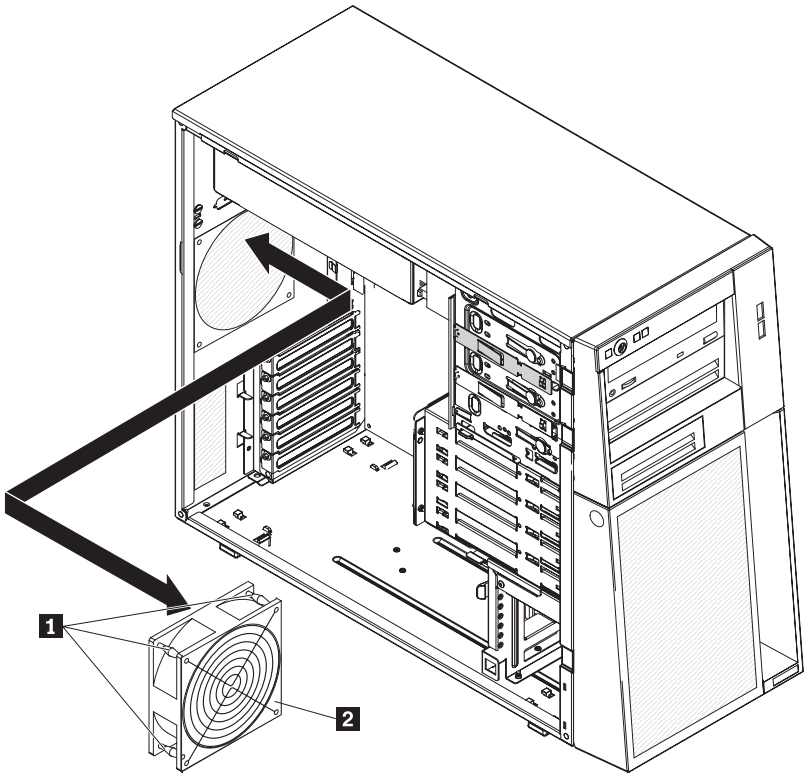
Removing the rear system fan

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To remove the rear system fan, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 32).
3. Remove any adapters that impede access to the fan and the fan connector on the system board (see “Removing an adapter” on page 55).
4. Disconnect the fan cable from the system board.
5. Grasp the fan **2** with both hands and pull firmly, extending the rubber grommets **1**. The grommets will be pulled through the holes in either the fan or the chassis and can then be removed.



6. Pull the fan up and out of the chassis.
7. If you are instructed to return the fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

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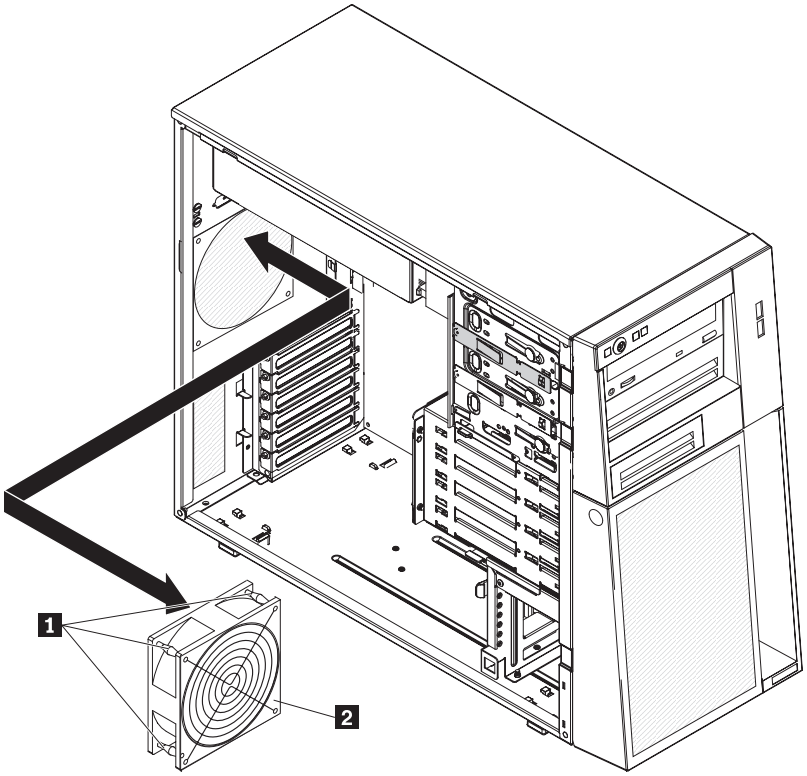
Installing the rear system fan

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

To install the rear system fan, complete the following steps:

1. The replacement fan comes with the rubber grommets installed **1** ; however, they might have come out during shipment. If any of the rubber grommets are missing from the fan, install them on the fan before you continue. Use needle-nosed pliers to pull the grommets through the holes in the fan.
2. Position the fan **2** so that the grommets protrude through the holes in the chassis; then, use needle-nosed pliers to pull the grommets through the holes from outside the chassis.



3. Connect the fan cable to the system board (see “System-board internal connectors” on page 19 for the location of the rear fan connector).
4. Install any adapters that you removed (see “Installing an adapter” on page 57).
5. Install the side cover (see “Installing the side cover” on page 33).
6. Lock the side cover if you unlocked it during removal.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the hard disk drive fan assembly

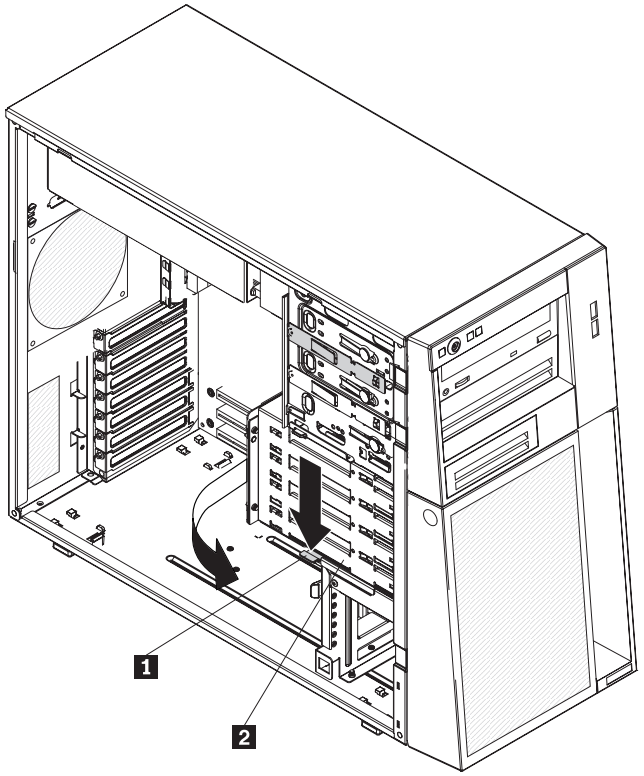
This procedure applies only to server models that have a hard disk drive fan assembly.

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

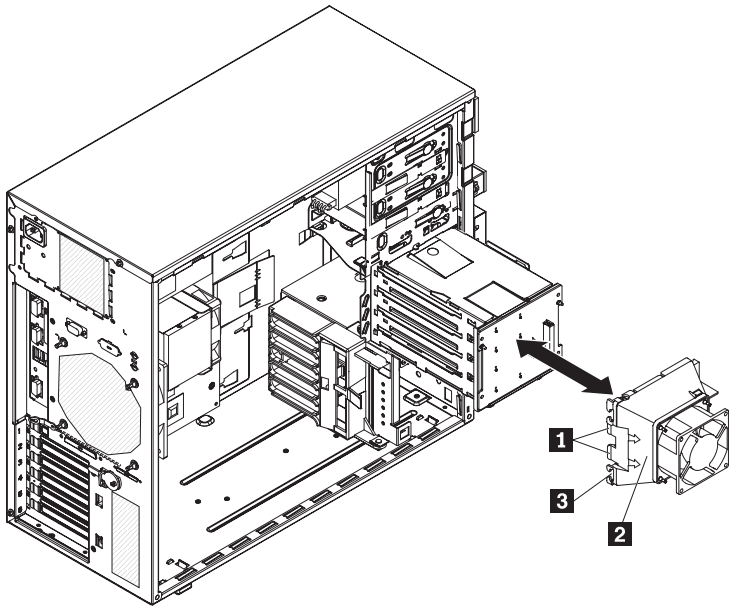
To remove the hard disk drive fan assembly, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Disconnect the hard disk drive fan assembly cable from the system board, making a note of the cable was connected to the hard disk drive fan connector for later installation.
6. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
7. Remove the hard disk drives.
8. Lift up and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.



1 Drive cage release tab
2 Hard disk drive cage

9. Pull out on the hard disk drive fan assembly release tabs; then, rotate the assembly away from the drive cage slightly.



1 Release tabs
2 Hard disk drive fan assembly
3 Slot

10. Remove the cable from the slot on the hard disk drive fan assembly; then, rotate the assembly away from the drive cage and remove the assembly from the drive cage.
11. If you are instructed to return the hard disk drive fan assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hard disk drive fan assembly

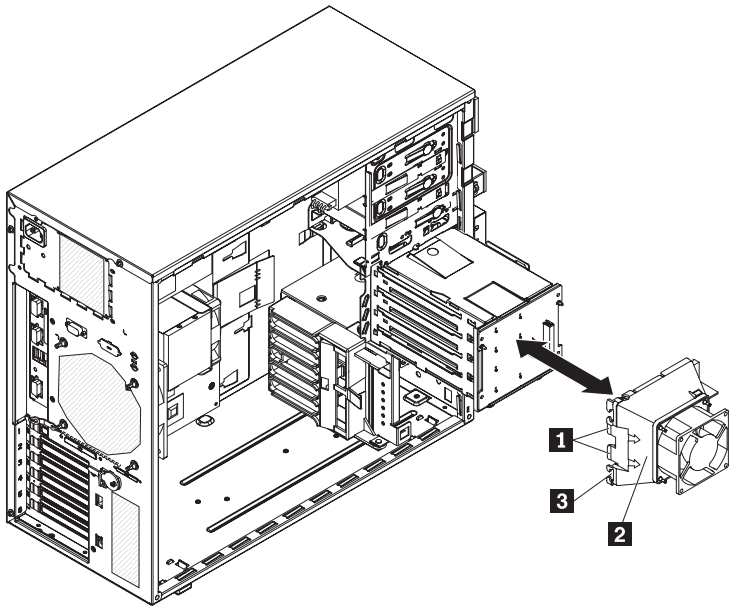
This procedure applies only to server models that have a hard disk drive fan assembly.

Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

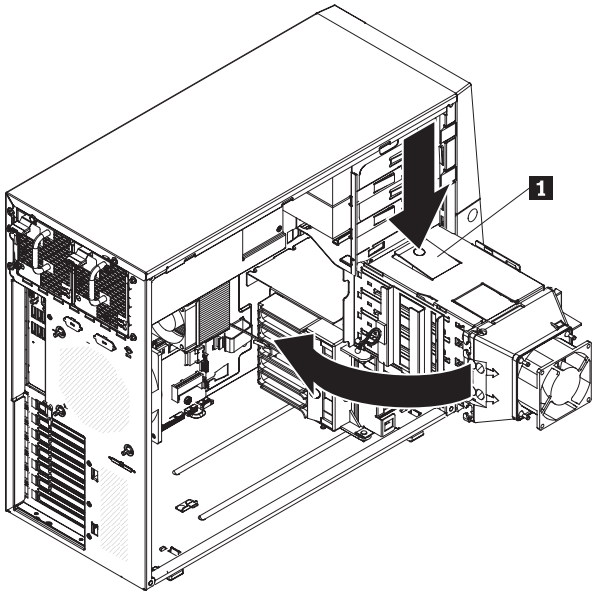
To install the hard disk drive fan assembly, complete the following steps:

1. Insert the hard disk drive fan assembly retaining tab over the right edge of the hard disk drive backplane; then, rotate the fan assembly toward the backplane. Do not fully close the hard disk drive fan assembly.



1 Release tabs
2 Hard disk drive fan assembly
3 Slot

2. Route the hard disk drive signal and power cables through the slots on the edge of the hard disk drive fan assembly. Make sure that the cables will not be pinched between the hard disk drive assembly and the hard disk drive backplane when the assembly is installed.
3. Rotate the hard disk drive fan assembly toward the backplane. Align the right edge of the hard disk drive fan assembly and the right edge of the backplane. Make sure the release tabs are fully engaged on the drive cage.
4. Rotate the drive cage toward the front of the server until it stops; then, lift and hold the retaining tab 1 on top of the drive cage while you rotate the drive cage into the chassis until it locks into place.



5. Connect the hard disk drive fan assembly cable to the system board (see “System-board internal connectors” on page 19 for the location of the hard disk drive fan connector).
6. Reinstall the hard disk drives.

   Note: Before you continue, check all internal power cables to be sure that they are connected to the system board and other optional devices.
7. Install the lower bezel (see “Installing the lower bezel” on page 36).
8. Install the side cover (see “Installing the side cover” on page 33).
9. Lock the side cover if you unlocked it during removal.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

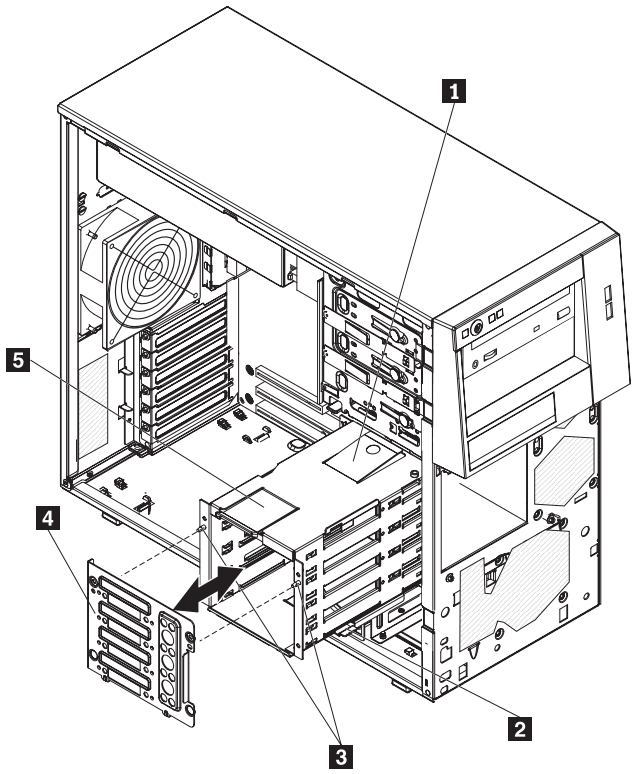
Removing the simple-swap backplate

This procedure applies only to server models with the simple-swap SATA backplate installed on the back of the hard disk drive cage.

To remove the simple-swap backplate, complete the following steps:

Note: You need a screwdriver in order to complete the steps.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
5. Remove the simple-swap hard disk drives that are installed in the hard disk drive cage (see “Removing a simple-swap hard disk drive” on page 53).
6. Remove the hard disk drive fan assembly from the hard disk drive cage (see “Removing the hard disk drive fan assembly” on page 75).
7. Disconnect the power cable from the simple-swap backplate.
8. Disconnect the signal cable from the system board.
9. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
10. Lift up on the retaining latch at the top of the drive cage; then, tilt the top of the simple-swap backplate away from the drive cage until it is clear of the locating pins.



1 Retaining tab
2 Drive cage release tab
3 Locating pins
4 Simple-swap backplate
5 Retaining latch

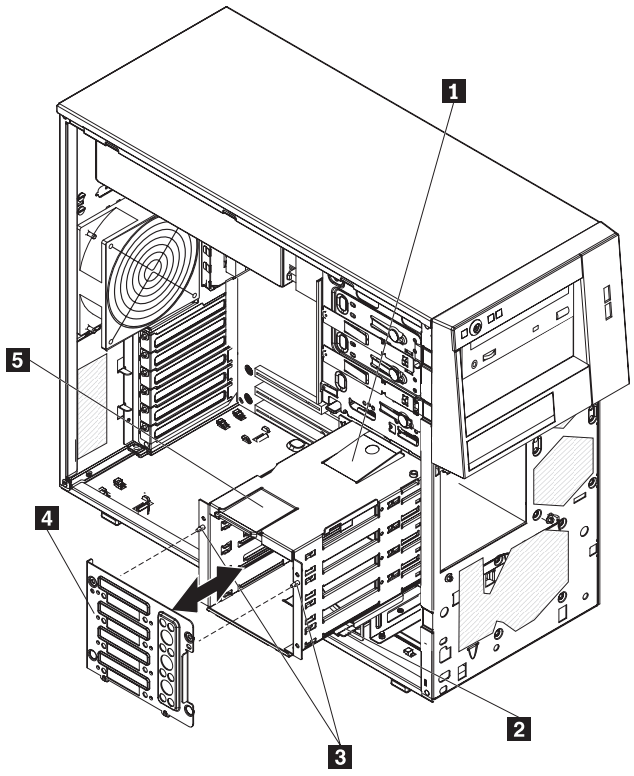
11. Lift the simple-swap backplate out of the lower lip on the drive cage and set it aside.
12. If you are instructed to return the simple-swap backplate, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the simple-swap backplate

This procedure applies only to server models with the simple-swap SATA backplate installed on the back of the hard disk drive cage.

To install the simple-swap backplate, complete the following steps.

1. Position the bottom edge of the simple-swap backplate on the lower lip of the drive cage.



1 Retaining tab
2 Drive cage release tab
3 Locating pins
4 Simple-swap backplate
5 Retaining latch

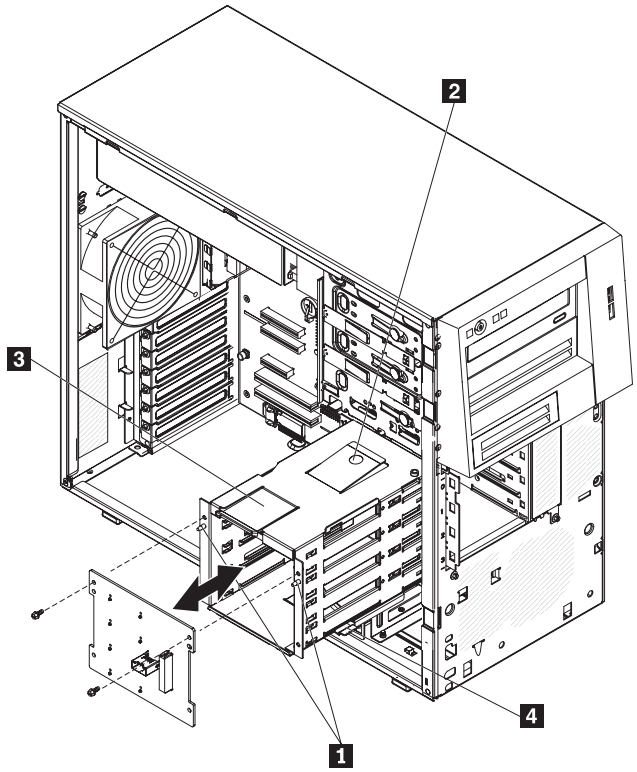
2. Tilt the top of the simple-swap backplate toward the drive cage and over the locating pins until the retaining latch is engaged securely.
3. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
4. Connect the signal cables to the system board (see “System-board internal connectors” on page 19 for the location of the Serial ATA drive connectors).
5. Connect the power cables to the simple-swap backplate.
6. Install the hard disk drive fan assembly on the hard disk drive cage (see “Installing the hard disk drive fan assembly” on page 76).
7. Install the simple-swap hard disk drives that you removed from the hard disk drive cage (see “Installing a simple-swap hard disk drive” on page 54).
8. Install the lower bezel (see “Installing the lower bezel” on page 36).
9. Install the side cover (see “Installing the side cover” on page 33).
10. Lock the side cover if you unlocked it during removal.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the SAS/SATA hard disk drive backplane

This procedure applies only to hot-swap server models with a SAS/SATA hard disk drive backplane installed on the back of the hard disk drive cage.

To remove the SAS/SATA hard disk drive backplane, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
5. Remove the hot-swap SAS/SATA hard disk drives installed in the hard disk drive cage (see “Removing a hot-swap hard disk drive” on page 49).
6. Remove the hard disk drive fan assembly from the hard disk drive cage (see “Removing the hard disk drive fan assembly” on page 75).
7. Disconnect the power and signal cables from the hard disk drive backplane.
8. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
9. Remove the two screws that secure the SAS/SATA hard disk drive backplane to the drive cage.



1 Locating pins
2 Retaining tab
3 Retaining latch
4 Drive cage release tab

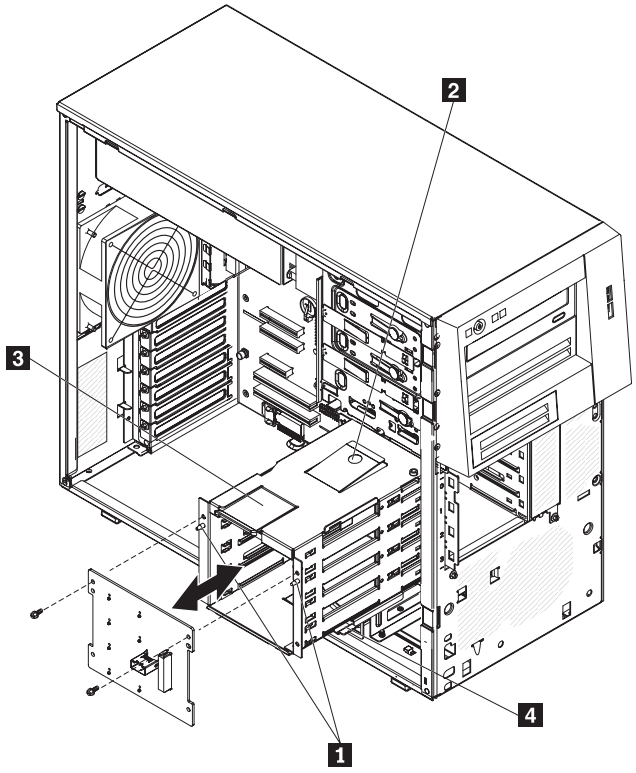
10. Tilt the top of the hard disk drive backplane away from the drive cage until it is clear of the locating pins.
11. Lift the SAS/SATA hard disk drive backplane out of the lower lip on the drive cage and set it aside.
12. If you are instructed to return the SAS/SATA hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the SAS/SATA hard disk drive backplane

This procedure applies only to hot-swap server models with a SAS/SATA hard disk drive backplane installed on the back of the hard disk drive cage.

To install the hard disk drive backplane, complete the following steps:

1. Place the bottom edge of the SAS/SATA hard disk drive backplane in the lower lip of the drive cage.
2. Tilt the top of the SAS/SATA hard disk drive backplane toward the drive cage and over the locating pins.



1 Locating pins
2 Retaining tab
3 Retaining latch
4 Drive cage release tab

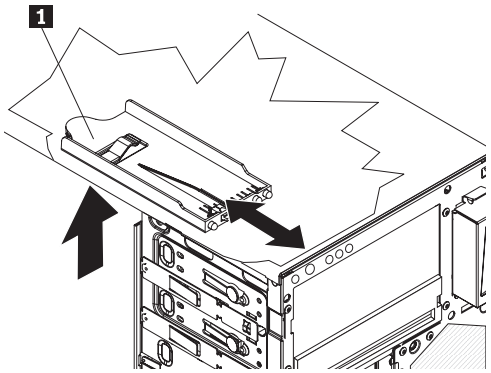
3. Install the two screws that secure the SAS/SATA hard disk drive backplane to the drive cage.
4. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
5. Connect the power and signal cables to the hard disk drive backplane.

6. Install the hard disk drive fan assembly onto the hard disk drive cage (see “Installing the hard disk drive fan assembly” on page 76).
7. Install the hot-swap hard disk drives that you removed from the hard disk drive cage (see “Installing a hot-swap hard disk drive” on page 51).
8. Install the lower bezel (see “Installing the lower bezel” on page 36).
9. Install the side cover (see “Installing the side cover” on page 33).
10. Lock the side cover if you unlocked it during removal.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front-panel assembly

To remove the front-panel assembly, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 34).
5. Slide the drives in bay 1 and bay 2 forward slightly (see “Removing a DVD drive” on page 44 for more information). It is not necessary to remove these drives.
6. If the server has hot-swap power supplies, remove the power supplies and the power-supply cage (see “Removing the hot-swap power supply cage” on page 87).
7. Disconnect the front-panel assembly cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 19 for the location of the front-panel connector).

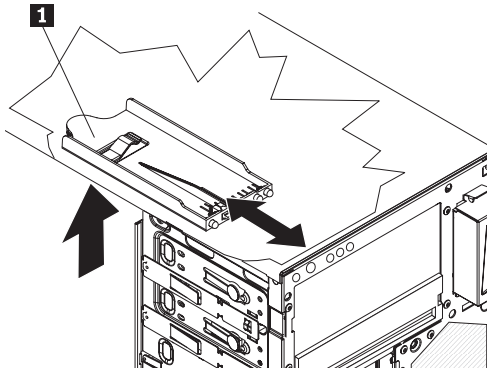


8. Press up on the release tab of the front-panel assembly **1** and pull the assembly toward the rear of the server; then, remove the front-panel assembly from the chassis.
9. If you are instructed to return the front-panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front-panel assembly

To install the front-panel assembly, complete the following steps:

1. Position the front end of the front-panel assembly in the channel above drive bay 1 on the left side of the chassis.

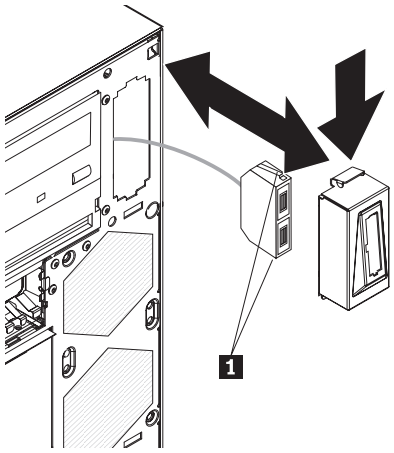


2. Push the front-panel assembly **1** toward the front of the chassis until it clicks into place.
3. Reroute and connect the front-panel assembly cable to the system board (see “System-board internal connectors” on page 19 for the location of the front-panel connector).
4. If the server has hot-swap power supplies, install the power-supply cage and the power supplies (see “Installing the hot-swap power supply cage” on page 88).
5. Push the drives in bay 1 and bay 2 into the drive bays (see “Installing a DVD drive” on page 45 for more information).
6. Install the upper bezel (see “Installing the upper bezel” on page 37).
7. Install the lower bezel (see “Installing the lower bezel” on page 36).
8. Install the side cover (see “Installing the side cover” on page 33).
9. Lock the side cover if you unlocked it during removal.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front USB connector assembly

To remove the front USB connector assembly, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 34).
5. Disconnect the front USB cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 19 for the location of the front USB connector).
6. Press down and hold the release tab on the top of the front USB housing; then, tilt the top of the housing away from the chassis and lift the housing out of the opening in the chassis.

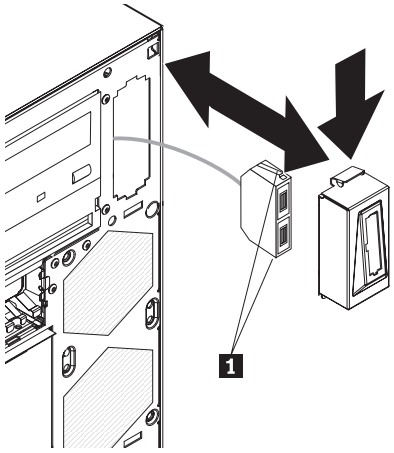


7. Squeeze the spring clips **1** on the sides of the front USB connector assembly and pull the assembly out of the back of the housing.
8. Carefully pull the front USB cable out of the opening in the chassis.
9. If you are instructed to return the front USB connector assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front USB connector assembly

To install the front USB connector assembly, complete the following steps:

1. Carefully insert the front USB cable through the opening in the front of the chassis.



2. Squeeze the spring clips **1** on the sides of the front USB connector assembly and insert the assembly into the housing through the back of the housing.
3. Place the bottom edge of the housing into the bottom of the opening in the chassis; then, tilt the top of the housing into position until it clicks into place.
4. Reroute and connect the front USB cable to the front USB connector on the system board (see “System-board internal connectors” on page 19 for the location of the front USB connector).
5. Install the upper bezel (see “Installing the upper bezel” on page 37).
6. Install the lower bezel (see “Installing the lower bezel” on page 36).
7. Install the side cover (see “Installing the side cover” on page 33).
8. Lock the side cover if you unlocked it during removal.

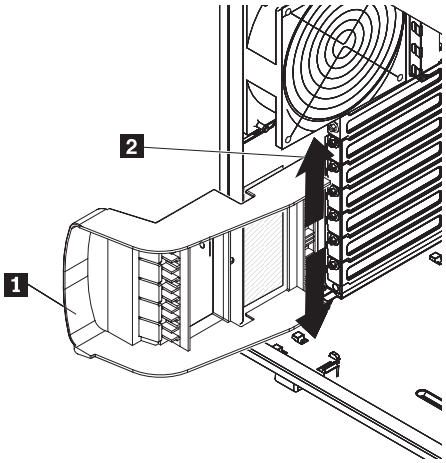
9. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the rear adapter retention bracket

To remove the rear adapter-retention bracket, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 32).
3. Remove all adapters (if necessary) and place the adapters on static-protective surface.

   Note: You might find it helpful to note where each adapter is installed before you remove the adapters.
4. Release the rear adapter-retention bracket by lifting up on the rear adapter-retention bracket, and rotate the bracket partially toward the closed position.
5. Grasp the bracket on one side at the hinge point and pull inward (while you rotate the bracket slightly toward the front of the server) until the bracket **1** is free of the hinge pin **2**; then, grasp the bracket on the other side at the hinge point, pull inward until the bracket is free of the hinge pin, and remove the rear adapter-retention bracket from the server.



Installing the rear adapter retention bracket

To install the rear adapter-retention bracket, complete the following steps:

1. Position the rear adapter retention bracket so that the hole in one of the hinge points is aligned with the hinge pin on the chassis; then, place the hinge pin through the hole on the chassis.
2. Rotate the rear adapter-retention bracket into place so that the hole in the opposite hinge point snaps into place over the hinge pin on the chassis.
3. Install the adapters.
4. Install the side cover (see “Installing the side cover” on page 33).
5. Lock the side cover if you unlocked it during removal.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the front adapter-retention bracket

To remove the front adapter-retention bracket, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Open the front and rear adapter-retention brackets.
5. Remove all adapters (if necessary) and place them on a static-protective surface.

   Note: You might find it helpful to note where each adapter is installed before you remove the adapters.
6. Grasp one side of the bracket at a hinge point and pull outward (while you rotate the bracket slightly toward the rear of the server) until the hinge pin on the bracket is free of the hole; then, grasp the bracket on the other side at the hinge point, pull outward until the bracket is free of the hinge pin, and remove the rear adapter-retention bracket from the server.

Installing the front adapter-retention bracket

To install the front adapter-retention bracket, complete the following steps:

1. Insert one of the hinge pins on the front adapter-retention bracket into the metal hinge point on the fan cage assembly.
2. Rotate the other hinge pin on the front adapter-retention bracket into position and push the hinge pin into the other metal hinge point. The hinge pin will protrude through the hole in the metal hinge point when the adapter-retention bracket is seated correctly.
3. Reinstall any adapters that you removed earlier.
4. Close the front and rear adapter retention brackets.
5. Install the side cover (see “Installing the side cover” on page 33).
6. Lock the side cover.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the hot-swap power supply cage

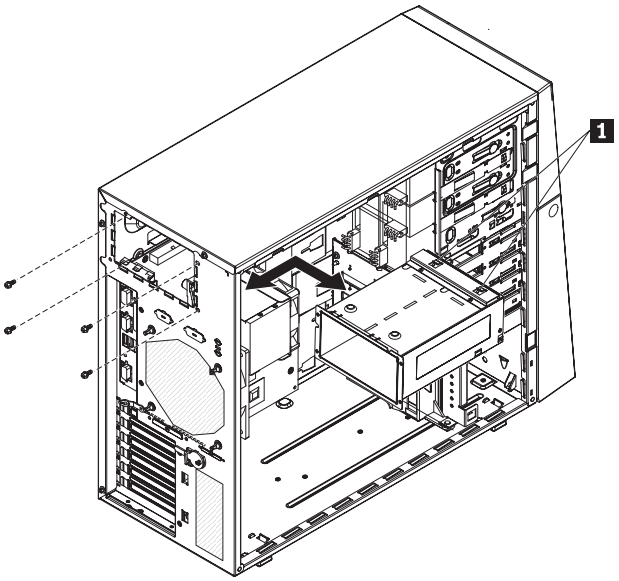
This procedure applies only to server models that have hot-swap power-supplies.

To remove the power-supply cage, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Remove the hot-swap power supplies (see “Removing a non-hot-swap power supply” on page 96).

   Note: It might be helpful to lay the server on its side for the remainder of this procedure.

5. Disconnect the cables from the power-supply cage to the system board and all internal components.
6. Remove the four black screws that secure the power-supply cage to the chassis; then, slide the cage toward the front of the server to disengage the retaining clips **1** from the top of the chassis and lift the cage out of the chassis.



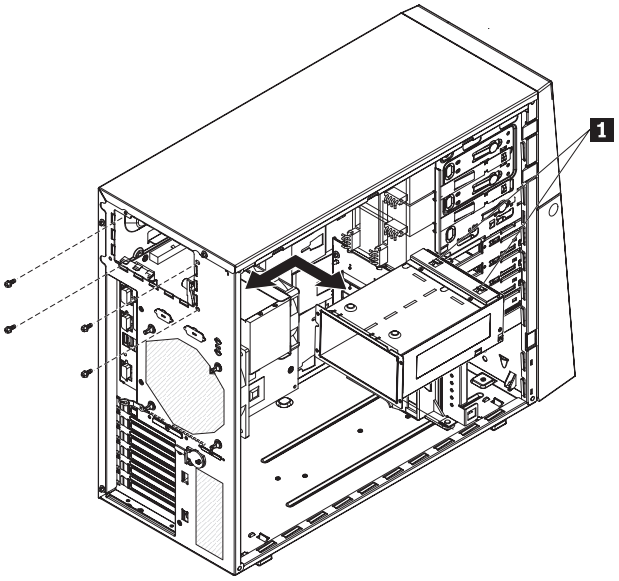
7. If you are instructed to return the power-supply cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap power supply cage

This procedure applies only to server models that have hot-swap power-supplies.

To install the hot-swap power supply cage, complete the following steps:

1. Place the power-supply cage into the chassis and slide it toward the rear of the server until the retaining clips **1** engage the top of the chassis.

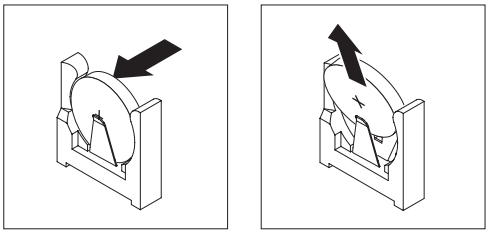


2. Install the four screws that secure the power-supply cage to the chassis.
3. Connect the cables from the power-supply cage to the system board and all internal components (see “System-board internal connectors” on page 19 for the locations of the internal connectors).
4. Reinstall both hot-swap power supplies (see “Removing the hot-swap power supply cage” on page 87).
5. Install the side cover (see “Installing the side cover” on page 33).
6. Lock the side cover if you unlocked it during removal.
7. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the battery

To remove the battery, do the following:

1. Read the safety information that begins on page vii and “Handling static-sensitive devices” on page 31.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.
4. Turn the server on its side so that it is lying flat, with the side cover facing up.
5. Unlock and remove the left-side cover (see “Removing the side cover” on page 32).
6. Locate the battery on the system board (see “System-board internal connectors” on page 19).
7. Remove the battery:
   a. Use one finger to push the battery horizontally out of its socket, pushing it away from the socket.
   b. Lift and remove the battery from the socket.



8. Dispose of the battery as required by local ordinances or regulations.

Installing the battery

The following notes describe information that you must consider when you replace the battery in the server:

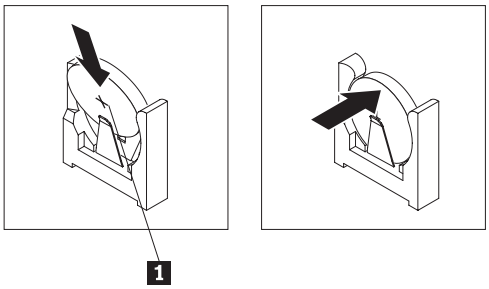
- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- After you replace the battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

CAUTION:
When replacing the lithium battery, use only Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**



To install the replacement battery, do the following:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the replacement battery **1** :
   a. Hold the battery in a vertical orientation so that the smaller side is facing the socket.
   b. Place the battery into its socket, and press the battery towards the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
3. Install and lock the left-side cover (see “Installing the side cover” on page 33).
4. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

   Note: You must wait approximately 2 1/2 minutes after you connect the server power cord to an electrical outlet before the power-control button becomes active.
5. Start the Setup Utility and reset the configuration:
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

   See “Starting the Setup Utility” on page 110 for details.

Removing and replacing FRUs

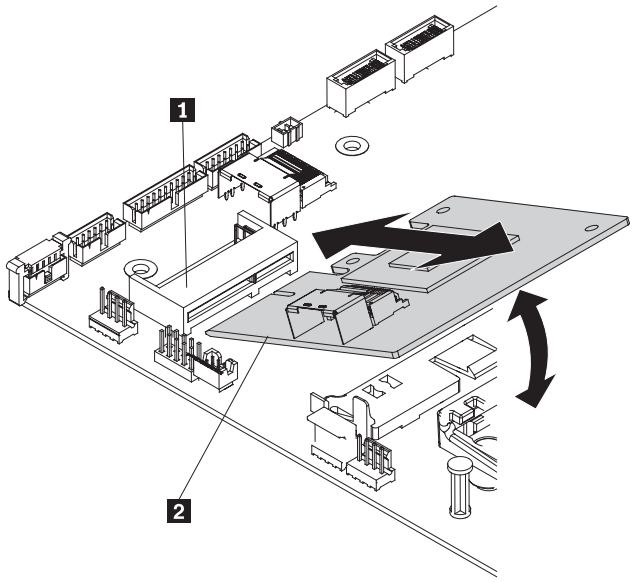
Field replaceable units (FRUs) must be installed only by trained service technicians.

Removing a ServeRAID BR10-il controller

To remove the ServeRAID BR10-il controller, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

   Note: When you disconnect the power source from the server, you lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Before you disconnect the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel and LEDs inside the server on the system board.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).
4. Open the rear adapter-retention bracket until the release lever on the right side of the bracket clicks into place.
5. Squeeze the tabs on both sides of the connector on the signal cable and remove the cable from the SAS/SATA controller.



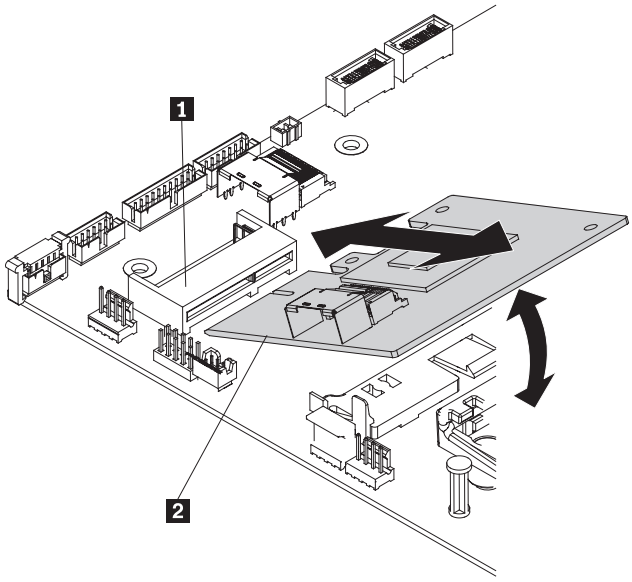
6. Carefully disengage the tabs on each side of the SAS/SATA controller connector and the front of the SAS/SATA controller from the plastic standoff.
7. Grasp the edges of the SAS/SATA controller and pull it out of the connector. If the standoff comes away from the system board with the controller, gently pull it out of the controller and push it back into the hole on the system board.
8. If you are instructed to return the SAS/SATA controller, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a ServeRAID BR10-il controller

To install the SAS/SATA RAID controller, complete the following steps:

1. Touch the static-protective package that contains the SAS/SATA controller to any unpainted surface on the outside of the server; then, remove the SAS/SATA controller from the package.
2. Position the SAS/SATA controller over the connector and the plastic standoff; then, press the SAS/SATA controller firmly into the connector and onto the

plastic standoff.



3. Connect the signal cable to the SAS/SATA controller.
4. Install and lock the side cover (see “Installing the side cover” on page 33).
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an optional ServeRAID-MR10i SAS/SATA controller

To remove a ServeRAID-MR10i SAS/SATA adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 32).
3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
4. Disconnect any cables connected to the adapter.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10i adapter connector, open and close the clips gently.
5. Carefully grasp the end of the ServeRAID adapter and pull it out of the connector.
6. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional ServeRAID-MR10i SAS/SATA controller

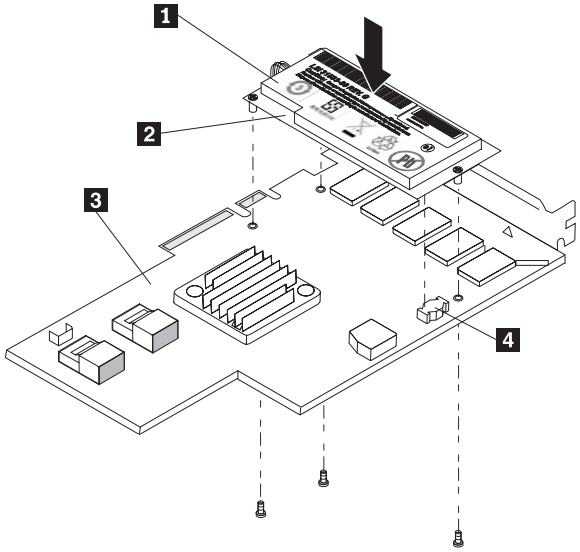
The optional IBM ServeRAID-MR10i SAS/SATA controller can be installed in either PCI slot 1 or slot 2 on the system board. The ServeRAID-MR10i adapter is supported on hot-swap server models only. The IBM ServeRAID-MR10i SAS/SATA adapter enables integrated RAID levels 0, 1, 5, 6, and 10 support capability on hot-swap hard disk drives. For configuration information, see the documentation on the ServeRAID CD that comes with the adapter.

Important: To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.xx-XXX, and the supporting drivers.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To install a ServeRAID-MR10i adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 29.
2. Touch the static-protective package containing the ServeRAID-MR10i adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-MR10i adapter from the package.
3. If the battery pack (battery carrier and battery) did not come installed on the ServeRAID adapter, install the battery pack.
   a. Align the battery carrier pins and the connector for the battery carrier with the pin holes and connector on the ServeRAID adapter; then, lower the battery carrier onto the ServeRAID adapter.



1 Battery
2 Battery carrier
3 RAID adapter
4 Connector for battery carrier

   b. Press the battery carrier into the connector on the ServeRAID adapter until it is firmly connected.
   c. Secure the battery carrier to the ServeRAID adapter with the screws that came with the battery pack.
4. Open the rear retention bracket.
5. Turn the ServeRAID-MR10i adapter so that the ServeRAID-MR10i adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10i adapter.
6. Take the signal cable that is attached to the drive backplane and connect it to the ServeRAID adapter.

   Note: When you restart the server, you are prompted to import the existing RAID configuration to the new ServeRAID adapter.

7. Press the ServeRAID-MR10i adapter firmly into the connector on the system board.
8. Reconnect the cables to the new ServeRAID-MR10i adapter.

Removing an optional ServeRAID-MR10is VAULT SAS/SATA controller

To remove a ServeRAID-MR10is SAS/SATA adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 29.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 32).
3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
4. Open the rear retention bracket.
5. Disconnect any cables connected to the adapter.

   Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is adapter connector, open and close the clips gently.
6. Carefully grasp the end of the ServeRAID adapter and pull it out of the connector.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional ServeRAID-MR10is VAULT SAS/SATA Controller

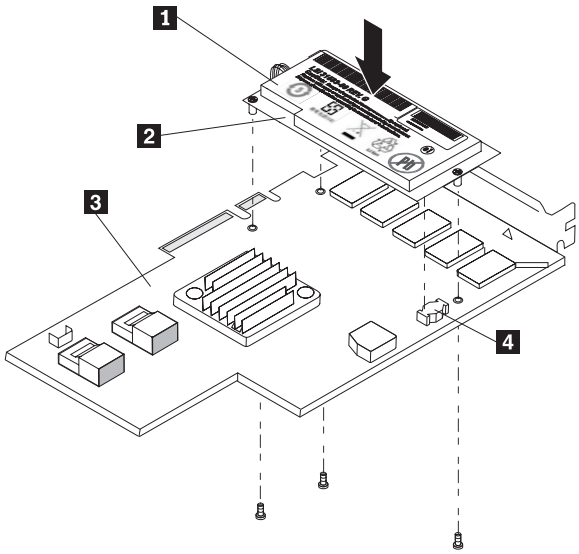
The optional IBM ServeRAID-MR10is VAULT SAS/SATA controller can be installed in either PCI slot 1 or slot 2 on the system board. The ServeRAID-MR10is adapter is supported on hot-swap server models only. The erveRAID-MR10is SAS/SATA adapter with an encryption 1078 DE chip set enables integrated RAID levels 0, 1, 5, 6, and 10 support capability on hot-swap hard disk drives. For configuration information, see the documentation on the ServeRAID CD that comes with the adapter.

Important: To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.xx-XXX, and the supporting drivers.

Attention: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To install the optional ServeRAID-MR10is SAS/SATA adapter, complete the following steps:

1. Read the safety information beginning on page vii, and “Installation guidelines” on page 29.
2. Touch the static-protective package containing the ServeRAID-MR10is adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-MR10is adapter from the package.
3. If the battery pack (battery carrier and battery) did not come installed on the ServeRAID adapter, install the battery pack.
   a. Align the battery carrier pins and the connector for the battery carrier with the pin holes and connector on the ServeRAID adapter; then, lower the battery carrier onto the ServeRAID adapter.



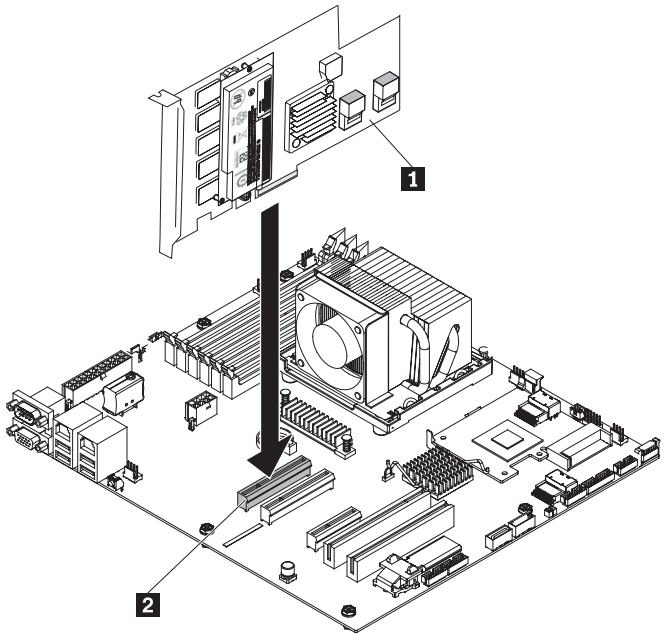
1 Battery
2 Battery carrier
3 RAID adapter
4 Connector for battery carrier

b. Press the battery carrier into the connector on the ServeRAID adapter until it is firmly connected.

c. Secure the battery carrier to the ServeRAID adapter with the screws that came with the battery pack.

4. Turn the ServeRAID-MR10is adapter so that the ServeRAID-MR10is adapter keys align correctly with the connector.

   Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10is adapter.



1 ServeRAID-MR10is

2 PCI slot

5. Press the ServeRAID-MR10is adapter firmly into the connector on the system board.
6. Reconnect the cables to the new ServeRAID-MR10is adapter. Make sure that the ServeRAID-MR10is SAS/SATA adapter is cabled.
7. Rotate the rear adapter-retention bracket to the closed (locked) position.
8. Install the side cover (see “Installing the side cover” on page 33).
9. Lock the side cover.
10. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing a non-hot-swap power supply

This procedure applies only to server models that have a non-hot-swap power supply. See “Removing the hot-swap power supply cage” on page 87 for information about the removal of a hot-swap power supply.

When you remove or install a non-hot-swap power supply, observe the following precautions.

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

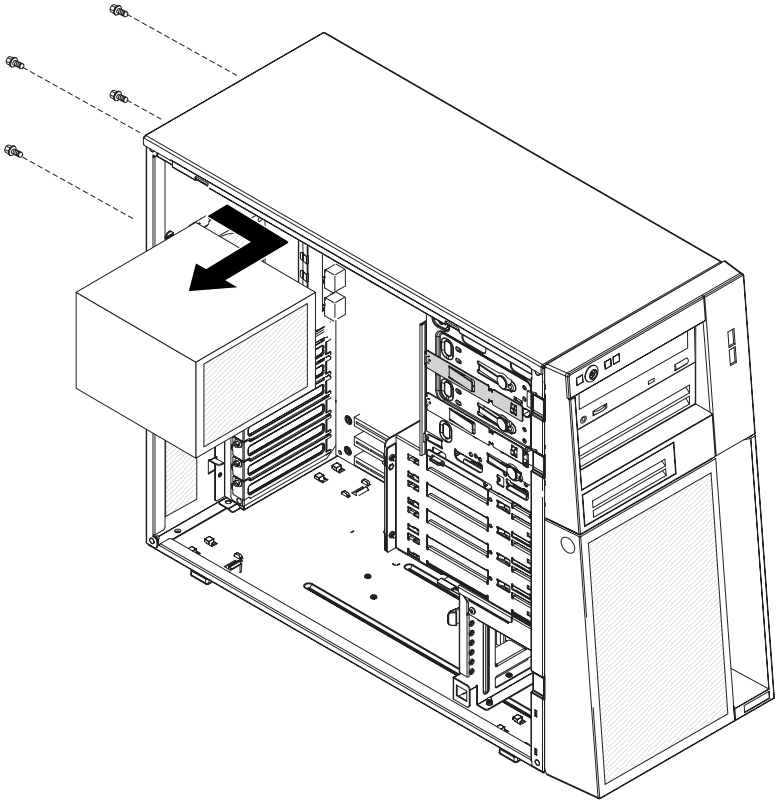
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

To remove a non-hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 32).

   Note: It might be helpful to lay the server on its side for the remainder of this procedure.
4. Disconnect the cables from the power supply to the system board and all internal components.

   Attention: Support the power supply while you remove the mounting screws. After the screws are removed, the power supply is loose and can damage other components in the server.
5. While you support the power supply, remove the four screws that secure it to the chassis; then, lift the power supply out of the chassis. Save the screws to use when you install the replacement power supply.



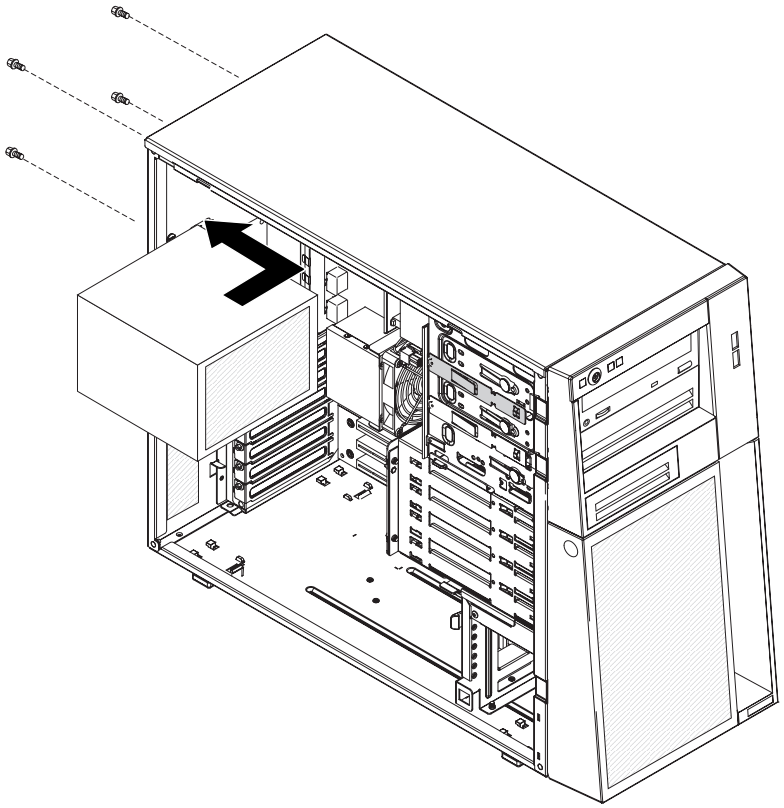
6. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a non-hot-swap power supply

This procedure applies only to server models that have a non-hot-swap power supply. See “Removing the hot-swap power supply cage” on page 87 for information about the installation of a hot-swap power supply.

To install a non-hot-swap power supply, complete the following steps:

1. Position the power supply in the chassis so that the screw holes in the power supply are aligned with the corresponding holes in the rear of the chassis.



2. Install the four screws that secure the power supply to the chassis.
3. Connect the cables from the power supply to the system board and all internal components (see “System-board internal connectors” on page 19 for the locations of the internal connectors).
4. Install the side cover (see “Installing the side cover” on page 33).
5. Lock the side cover if you unlocked it during removal.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

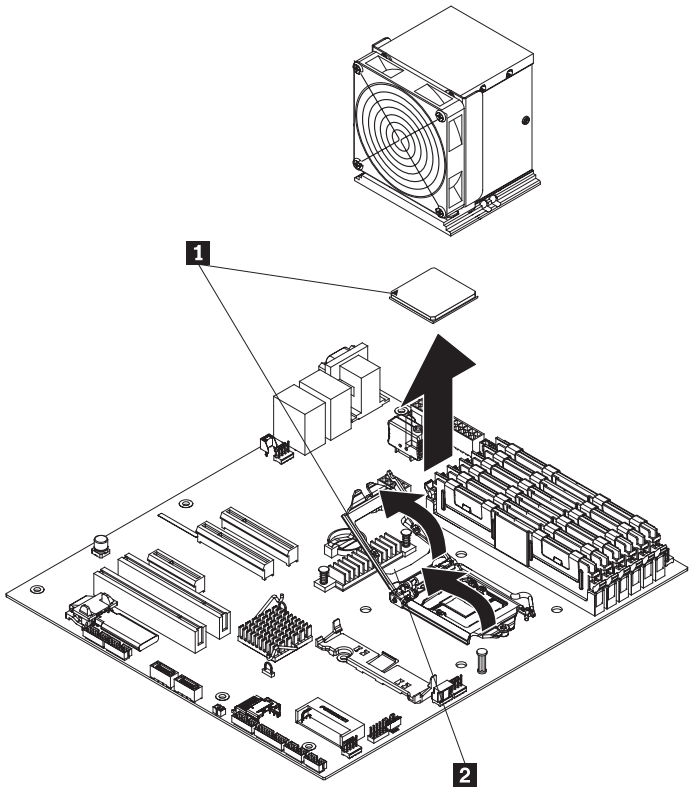
Removing the microprocessor and fan sink

To remove the microprocessor and fan sink, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Turn the server on its side so that it is lying flat, with the cover facing up.
4. Unlock and remove the side cover (see “Removing the side cover” on page 32).
5. Remove the lower bezel (see “Removing the two-piece bezel” on page 34).
6. Remove the hard disk drives.
7. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
8. Disconnect any cables that impede access to the fan sink and microprocessor.

   Attention: The fan-sink retention lever is spring-loaded when the fan sink is in place. Releasing the lever too quickly or allowing it to spring upward can damage the fan sink and surrounding components.
9. Remove the fan sink from the microprocessor:
   a. Disconnect the fan-sink cable from the system board.
   b. Release the fan-sink retention lever by pressing down on the end, moving it to the side and slowly releasing it to the open (up) position.

      Important: Be careful when you handle the microprocessor and fan sink. If the microprocessor and fan sink will be reused, do not contaminate the thermal material between them.



c. Tip the top of the fan sink toward the front of the server while you slide it away from the lower flange of the retention module; then, remove it from the server. After removal, place the fan sink on its side on a clean, flat surface.

Attention: The microprocessor retention latch is spring-loaded when the microprocessor is in place. Releasing the latch too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.

10. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.
11. Open the microprocessor bracket frame by lifting up the tab on the top edge.
12. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
13. If you are instructed to return the microprocessor and fan sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

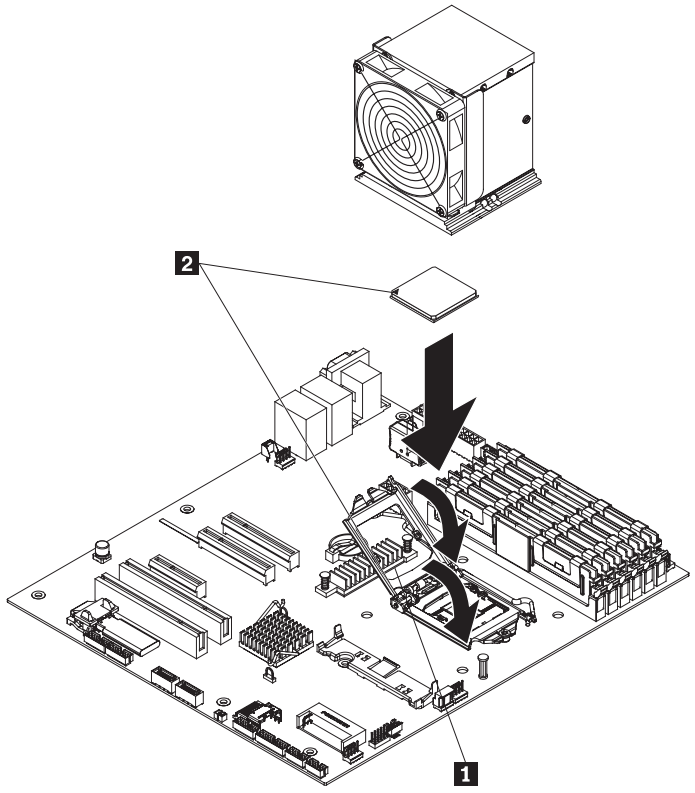
Installing a microprocessor and fan sink

To install the microprocessor, complete the following steps:

1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.
3. Rotate the release lever on the microprocessor socket to the fully open position.

   Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.
4. Carefully grasp the microprocessor and place the microprocessor into the microprocessor socket.

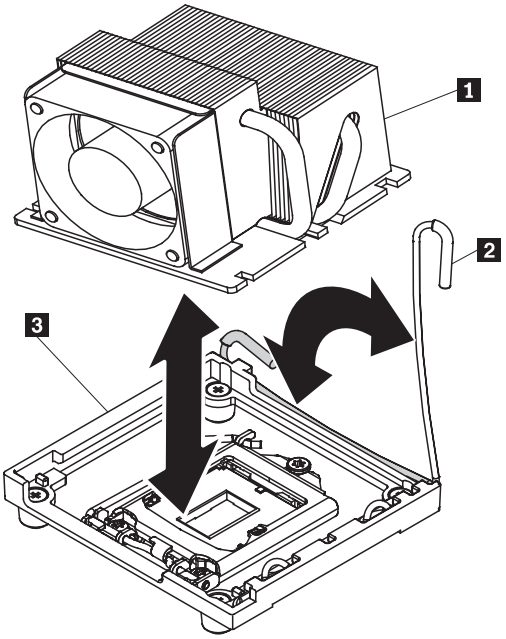
   Note: To maintain correct orientation between the microprocessor and the microprocessor socket during installation, observe the following information:
   - The microprocessor has two notches that are keyed to two tabs on the sides of the socket.
   - A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on one corner of the socket.
   - Do not use excessive force when you press the microprocessor into the socket.



5. Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.
6. Install the fan sink:

a. Make sure that the fan sink retention lever is in the fully open position.

Important: Be careful when you handle the microprocessor and fan sink. Do not contaminate the thermal material between them.



b. Slide the bottom edge of the fan sink under the lower flange of the retention module; then, place the top of the fan sink onto the top of the retention module.

c. Close the fan sink retention lever and lock it securely in place.

d. Reconnect the fan sink cable to the system board (see “System-board internal connectors” on page 19 for the location of the fan-sink connector).

7. Reconnect any cables that you disconnected during the removal of the old microprocessor.
8. Rotate the drive cage toward the front of the server until it stops; then, lift and hold the retaining tab on top of the drive cage while you rotate the drive cage into the chassis until it locks into place.
9. Reinstall the hard disk drives.
10. Install the lower bezel (see “Installing the lower bezel” on page 36).
11. Install the side cover (see “Installing the side cover” on page 33).
12. Lock the side cover if you unlocked it during removal.
13. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Thermal grease

The thermal grease must be replaced whenever the fan sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the fan sink on the same microprocessor that is was removed from, make sure that:

- The thermal grease on the fan sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the fan sink and microprocessor.

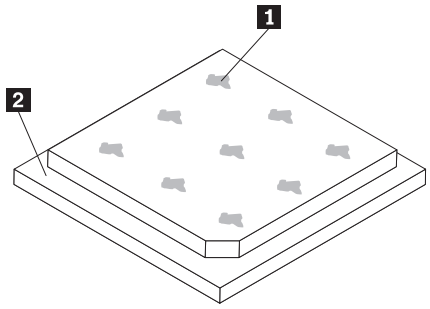
Note:

- Read the Safety information on page vii.
- Read the “Installation guidelines” on page 29.

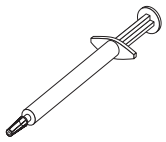
To replace damaged or contaminated thermal grease on the microprocessor and fan sink, complete the following steps:

1. Place the fan sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the fan sink.

   Note: Make sure that all of the thermal grease is removed.
4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor, this is to ensure uniform distribution of the grease.



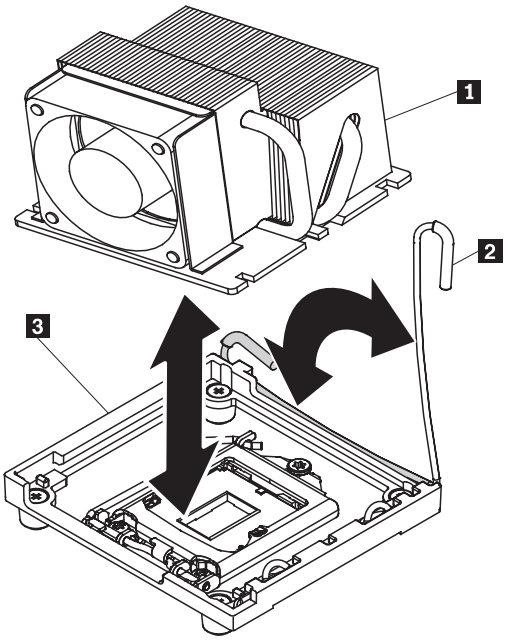
   Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.
6. Install the fan sink onto the microprocessor as described in “Installing a microprocessor and fan sink” on page 101.

Removing the system board

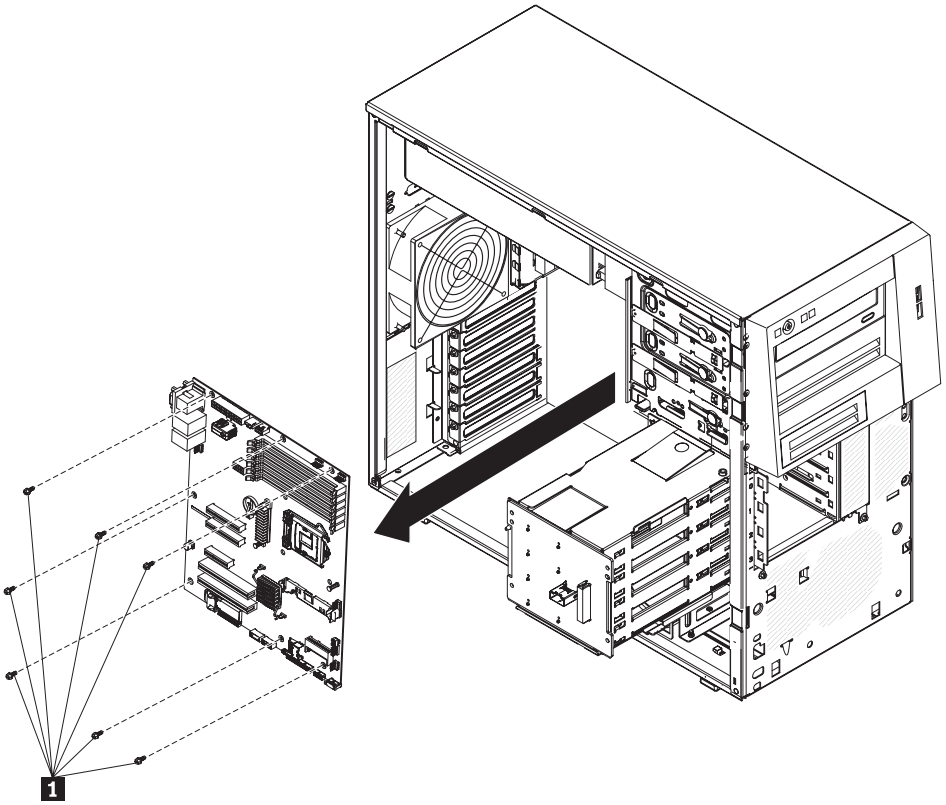
To remove the system board, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 29.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Turn the server on its side so that it is lying flat, with the cover facing up.
4. Unlock and remove the side cover (see “Removing the side cover” on page 32).
5. Note where each cable is connected; then, disconnect all cables from the system board.
6. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
7. Remove any of the following components (in addition to others that might not be listed) that are installed on the system board and put them in a safe, static-protective place:
   - Adapters (see “Removing an adapter” on page 55).
   - SAS/SATA controller (see “Removing a ServeRAID BR10-il controller” on page 91).
   - Virtual media key (see “Removing the virtual media key” on page 62).
   - Microprocessor and fan sink (see “Removing the microprocessor and fan sink” on page 99).
   - DIMMs (see “Removing a memory module” on page 37).
   - Battery (see “Installing the battery” on page 89).
   - SAS/SATA controller (see “Removing a ServeRAID BR10-il controller” on page 91).
   - Hypervisor key (see “Removing a USB embedded hypervisor flash device” on page 61).
   - The fan connector covers.
8. Remove the four screws that secure the fan sink retention module and fan sink mounting bracket to the system board; then, set the fan sink retention module, fan sink mounting bracket, and screws aside for use later.

   Note: Make sure that you observe the orientation of the fan sink retention module before you move it so that when you reinstall it, you install it in the same orientation.



9. Remove the eight screws (seven in front and one in rear) **1** that secure the system board to the chassis.



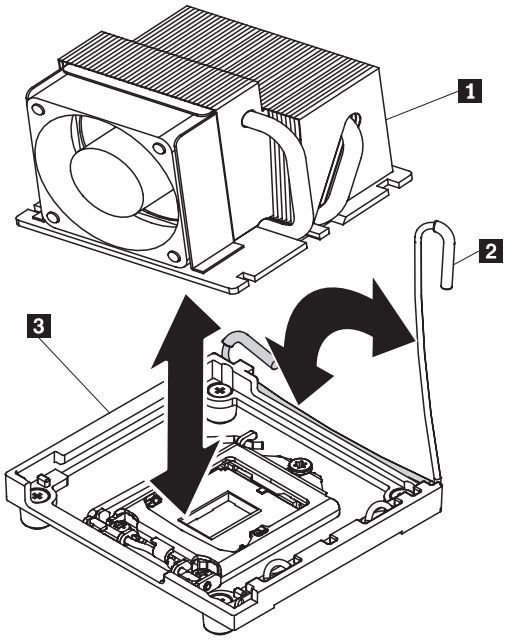
10. Slide the system board toward the front of the server to disengage the tabs on the fan sink mounting bracket from the slots on the bottom of the chassis; then, carefully lift the system board out of the server.
11. Remove the fan connector covers from fan connectors 1, 3, and 5 on the system board. Then, put the fan connector covers aside for use later.

12. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

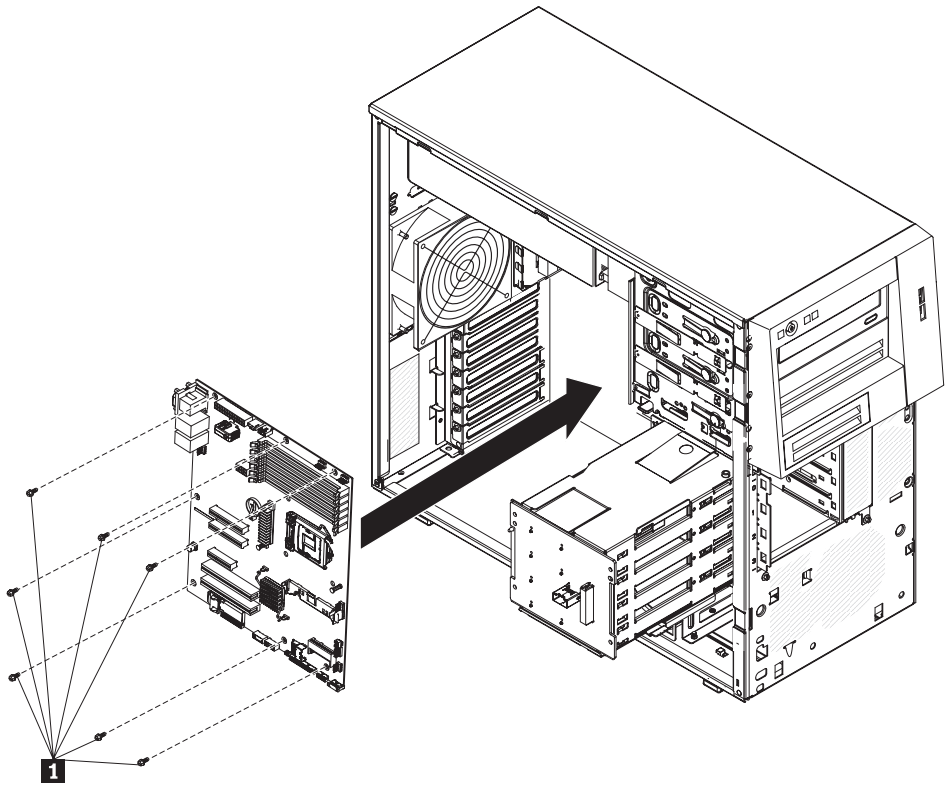
To install the system board, complete the following steps:

1. Touch the static-protective package that contains the system board to any unpainted metal surface on the server. Then, remove the system board from the package.
2. Install the fan connector covers onto fan connectors 1, 3, and 5 on the system board.
3. Place the fan sink mounting bracket underneath the system board and align the holes on fan sink mounting bracket with the four screw holes for the fan sink retention module slot on system board. Place the fan sink retention module on top of the system board and align it with the four screw holes for the fan sink retention module slot (make sure that the fan sink retention module orientation of the is correct). Take the four screws that you removed earlier and secure the fan sink mounting bracket and the fan sink retention module to the system board.



4. Insert the system board into the chassis and slide it toward the rear of the server until the tabs on the fan sink mounting bracket is fully engaged in the holes for fan sink mounting bracket slots on the bottom the chassis.

   Note: The tabs are fully engaged when the screw holes in the system board are aligned with the corresponding holes in the chassis.



5. Install the eight screws (seven in front and one in rear) that secure the system board to the chassis.
6. Install any of the following components that you removed from the system board:
   - The fan connector covers.
   - Hypervisor key (see “Installing a USB embedded hypervisor flash device” on page 61).
   - Virtual media key (see “Installing the virtual media key” on page 63).
   - SAS/SATA controller (see “Installing a ServeRAID BR10-il controller” on page 91).
   - Battery (see “Installing the battery” on page 89).
   - DIMMs (see “Installing a memory module” on page 38).
   - Microprocessor and fan sink (see “Installing a microprocessor and fan sink” on page 101).
   - Adapters (see “Installing an adapter” on page 57).
7. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
8. Reconnect any cables to the system board that you disconnected during removal.
9. Install the side cover (see “Installing the side cover” on page 33).
10. Lock the side cover if you unlocked it during removal.
11. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Chapter 7. Configuring the server

The following configuration programs come with the server:

- **Setup Utility**

  The Setup Utility (formerly called the Configuration/Setup Utility program) is part of the server firmware. Use it to change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see “Using the Setup Utility” on page 110.

- **Boot Menu program**

  The Boot Menu program is part of the server firmware. Use it to override the startup sequence that is set in the Setup Utility and temporarily assign a device to be first in the startup sequence.

- **Integrated management module**

  Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using the IMM, see “Using the Integrated Management Module” on page 123.

- **Remote presence capability and blue-screen capture**

  The remote presence and blue-screen capture feature are integrated into the integrated management module (IMM). These features allow you to access the network remotely and to mount or unmount drives or images on the client system. For more information about how to enable the remote presence function, see “Using the remote presence capability and blue-screen capture” on page 125.

- **Advanced Settings Utility (ASU) program**

  Use this program as an alternative to the Setup Utility for modifying UEFI settings and IMM settings. Use the ASU program online or out-of-band to modify UEFI settings from the command line without the need to restart the server to access the Setup Utility. For more information about using this program, see “Advanced Settings Utility program” on page 126.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 122.

- **LSI Configuration Utility program**

  Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see “Using LSI Configuration Utility program” on page 119.

  The following table lists the different server configurations and the applications that are available for configuring and managing RAID arrays.

Table 14. Server configurations and applications for configuring and managing RAID arrays

Server configuration	RAID array configuration (before operating system is installed)	RAID array management (after operating system is installed)
ServeRAID BR10il v2	LSI Utility (invoked from the Setup Utility)	MegaRAID Storage Manager (for monitoring storage only)

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Table 14. Server configurations and applications for configuring and managing RAID arrays (continued)

Server configuration	RAID array configuration (before operating system is installed)	RAID array management (after operating system is installed)
ServeRAID-MR10i SAS/SATA Controller (LSI 1078) installed	MegaRAID Storage Manager (MSM), MegaRAID BIOS Configuration Utility (press C to start)	MegaRAID Storage Manager (MSM)

Using the Setup Utility

Use the Setup Utility, formerly called the Configuration/Setup Utility program, to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Resolve configuration conflicts

Starting the Setup Utility

To start the Setup Utility, do the following:

1. Turn on the server.

   Note: Approximately 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup Utility menu. If you do not type the administrator password, a limited Setup Utility menu is available.
3. Select the settings to view or change.

Setup Utility menu choices

The following choices are on the Setup Utility main menu. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup Utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information.

  This choice is on the full Setup Utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other choices in the Setup

Utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

– **Product Data**

  Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings. To configure memory mirroring, select **System Settings → Memory**, and then select **Memory Channel Mode → Mirroring**.

  – **Devices and I/O Ports**

    Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA controller, SATA optical drive channels, and PCI slots. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

  – **Power**

    Select this choice to view or change power capping to control consumption, processors, and performance states.

  – **Legacy Support**

    Select this choice to view or set legacy support.

    - **Force Legacy Video on Boot**

      Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

    - **Rehook INT 19h**

      Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

    - **Legacy Thunk Support**

      Select this choice to enable or disable the UEFI to interact with PCI mass storage devices that are not UEFI-compliant.

  – **Integrated Management Module**

    Select this choice to view or change the settings for the integrated management module.

    - **POST Watchdog Timer**

      Select this choice to view or enable the POST watchdog timer.

    - **POST Watchdog Timer Value**

      Select this choice to view or set the POST loader watchdog timer value.

    - **Reboot System on NMI**

      Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Enabled** is the default.

    - **Commands on USB Interface Preference**

      Select this choice to enable or disable the Ethernet over USB interface on IMM.

- **Network Configuration**

  Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and host name; define the static IMM IP address, subnet mask, and gateway address; specify whether to use the static IP address or have DHCP assign the IMM IP address; save the network changes.

- **Reset IMM to Defaults**

  Select this choice to view or reset IMM to the default settings.

– **Adapters and UEFI Drivers**

  Select this choice to view information about the adapters and drivers in the server that are compliant with UEFI 1.10 and UEFI 2.0.

- **Network**

  Select this choice to view or configure the network options, such as the iSCSI, PXE, and network devices. There might be additional configuration choices for optional network devices that are compliant with UEFI 2.1 and later.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

  This choice is on the full Setup Utility menu only.

- **Start Options**

  Select this choice to view or boot to devices, including the startup sequence.

  This choice is on the full Setup Utility menu only.

- **Boot Manager**

  Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the WAKE on LAN functions. For example, you can define a startup sequence that checks for media in a CD-RW/DVD drive, then checks the hard disk drive, and then the network adapter.

- **System Event Logs**

  Select this choice to enter the System Event Manager, where you can view the error messages in the system-event logs. You can use the arrow keys to move between pages in the error log.

  The system-event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur. See the *Hardware Maintenance Manual* for instructions for running the diagnostic programs.

  Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the system-event log. Also, after you complete a repair or correct an error, clear the system-event log to turn off the system-error LED on the front of the server.

  – **POST Event Viewer**

    Select this choice to enter the POST event viewer to view the error messages in the POST event log.

  – **System Event Log**

    Select this choice to view the error messages in the system-event log.

  – **Clear System Event Log**

    Select this choice to clear the system-event log.

- **User Security**

  Select this choice to set, change, or clear passwords. See “Passwords” for more information.

  This choice is on the full and limited Setup Utility menu.

  – **Set Power-on Password**

    Select this choice to set or change a power-on password. For more information, see “Power-on password” on page 114.

  – **Clear Power-on Password**

    Select this choice to clear a power-on password. For more information, see “Power-on password” on page 114.

  – **Set Administrator Password**

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. If an administrator password is set, the full Setup Utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 114.

  – **Clear Administrator Password**

    Select this choice to clear an administrator password. For more information, see “Administrator password” on page 114.

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Setup Utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **User Security** menu choice, you can set, change, and delete a power-on password and an administrator password. The **User Security** choice is on the full Setup Utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on

password has access to only the limited Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A - Z, a - z, and - 9) for the password.

If you forget the power-on password, you can regain access to the server in the following way:

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup utility and reset the power-on password.

Administrator password

An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

To use the Boot Manager program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press Enter.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

RAID controllers

The following table lists the various utilities available to configure RAID controllers before an operating system is installed.

Table 15. RAID utilities

RAID configuration utility	Description	Location	Where to find more information
EasyStartup RAID configuration utility	• For use with all factory-supported RAID controllers • Automatically detects hardware and lists all supported RAID configurations • Configures one disk array per controller using all drives currently attached to the controller • Created a RAID response file that can be used to configure RAID controllers on similarly configured Lenovo servers.	EasyStartup DVD	"Using the ThinkServer EasyStartup program" on page 117
MegaRAID BIOS Configuration Utility (WebBIOS)	For: • ServeRAID-MR10i controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + H at the WebBIOS prompt during startup.	"Using the WebBIOS utility"
LSI Logic MPT Setup Utility	For: • ServeRAID BR10il controller	In system firmware. To access: • Use UEFI Setup Utility. • Press Ctrl + C at the LSI prompt during startup.	"Using LSI Configuration Utility program" on page 119

Using the WebBIOS utility

The WebBIOS configuration utility enables you to create and manage RAID configurations on LSI SAS controllers. The WebBIOS utility resides in the SAS controller BIOS and operates independently of the operating system. The WebBIOS utility provides a configuration wizard to guide you through the configuration of virtual disks and physical arrays.

Starting the WebBIOS utility

Perform the following steps to start the WebBIOS utility and access the main menu:

1. After you turn on the power and when the computer is starting, you are prompted to press Ctrl + H when the following message is displayed:

   ```
   Copyright© LSI Logic Corporation
   Press <Ctrl><H> for WebBIOS
   ```

2. Select an adapter from the list.
3. Click **Start**. The main WebBIOS utility interface is displayed. You can toggle between the physical view and logical view of the storage devices that are connected to the controller. Click **Physical View** or **Logical View** on the menu in the left pane to change the view.

Main menu of the WebBIOS utility

The main menu includes the following options:

Adapter Properties
From this view, you can display and modify the properties of the SAS adapter that is currently selected.

Scan Devices
From this view, you can re-scan the physical and virtual disks for any changes in the drive status or physical configuration.

Virtual Disks
From this view, you can display and modify the virtual disk properties, delete virtual disks, initialize disks, and perform other tasks.

Physical Drives
From this view, you can view the physical drive properties, create hot spare disks, and perform other tasks.

Configuration Wizard
Select this to start the Configuration Wizard and create a new storage configuration, clear a configuration, or add a new configuration.

Adapter Selection
From this view, you can select a different SAS adapter. Then, you can view information about the adapter and the drives connected to it, or create a new configuration for the adapter.

Physical View or Logical View
Select this to toggle between the Physical View and Logical View.

Events
From this view, you can display the system events in the Event Information page.

Exit Select this to exit the WebBIOS utility and continue with the system boot.

Creating a storage configuration using the Configuration Wizard

Follow these steps to start create a storage configuration:

1. Click **Configuration Wizard** to start the wizard.
2. Select a configuration option:

   Attention: If you select **Clear Configuration** or **New Configuration**, all existing data in the configuration is deleted. Make a backup copy of any data that you want to keep before selecting these options.

   Clear Configuration
   Clears the existing configuration.

New Configuration
Clears the existing configuration and lets you create a new configuration.

Add Configuration
Retains the existing storage configuration and adds new drives to it (this does not cause any data loss).

3. Click **Next**.
4. Select a configuration mode from the following options:

   Custom Configuration
   In this mode, you can control all attributes of the new storage configuration.

   Auto Configuration and Redundancy
   This mode automatically creates an optimal RAID 1 or RAID 5 configuration, providing data redundancy.

   Auto Configuration without Redundancy
   This mode automatically created a non-redundant RAID 0 configuration.
5. Click **Next** to continue.

Viewing and changing adapter properties

You can view information for one LSI SAS adapter at a time. If your system has multiple LSI SAS adapters, you can view information for a different adapter, click **Adapter Selection** on the main view. To view the properties for the currently selected adapter, click **Adapter Properties** on the main WebBIOS screen.

Viewing and changing virtual disk properties

On the WebBIOS main screen, select a virtual disk from the list and click **Virtual Disk**.

The Properties panel displays the RAID level, state, size, and stripe size.

The Policies panel lists the virtual disk policies that were defined when the storage configuration was created. To change any of these policies, select a policy from the menu and click **Change**. The Operations panel lists operations that can be performed on the virtual disk. Select the operation and click **Go**. Then choose from the following operations:

- Select **Del** to delete this virtual disk.
- Select **Locate** and the LEDs flash on the physical drives used by this virtual disk.
- Select **Fast** or **Slow** to initialize this virtual disk.

  Attention: Before you run an initialization, back up any data on the virtual disk that you want to save. All data on the virtual disk is lost when you initialize it.

Using the ThinkServer EasyStartup program

The *ThinkServer EasyStartup* DVD simplifies the process of configuring your RAID controllers and installing an operating system. The program works in conjunction with your Windows or Linux operating-system installation disc to automate the process of installing the operating systems and associated device drivers.

If you did not receive an *ThinkServer EasyStartup* DVD with your server, you can download an image from the Lenovo Support Web site at http://www.lenovo.com/support.

The EasyStartup program has the following features:

- Self-booting DVD
- Easy-to-use, language-selectable interface
- Integrated help system
- Automatic hardware detection
- RAID configuration utility
- Device drivers provided based on the server model and detected devices
- Selectable partition size and file system
- Support for multiple operating systems
- Installs the operating system and device drivers in an unattended mode to save time
- Creates a reuseable response file that can be used with similarly configured Lenovo servers to make future installations even faster.

Before you use the EasyStartup DVD

Functionality and supported operating systems can vary with different versions of the EasyStartup program. To learn more about the version you have, do the following:

1. Insert the *ThinkServer EasyStartup* DVD and restart the server.
2. Advance to the Home screen.
3. Click **Compatability notes**. The compatability notes feature provides detailed information about the RAID controllers, operating systems, and server configurations supported by that version of the EasyStartup program.
4. Click **User Guide**. The User Guide provides an overview of the various functions provided by that version of the EasyStartup program.

Before using the EasyStartup program to install an operating system, make sure any external storage devices and fiber channels are configured correctly.

Setup and configuration

When you start the *ThinkServer EasyStartup* DVD, you will be prompted for the following:

- Select the language in which you want to view the program.
- Select the language of the keyboard you will be using with the program.

Note: The following language keyboards are supported: English, French, German, Spanish, Japanese, Turkish, Italian, and Dutch.

You will then see one or more reminders about configuring storage devices, and then you will be presented with the Lenovo License Agreement. Read the license agreement carefully. You must agree with terms in order to continue.

After agreeing to the license agreement, you will be given the following choices:

- Continue to the main program interface
- Use a shortcut to install an operating system based a response file that you previously created using the EasyStartup program
- Use a shortcut to configure RAID controllers based on a RAID response file that you previously created using the EasyStartup program

If you continue to the main program interface, you will have the following selectable options:

- **Compatibility notes:** This selection provides information about the RAID controllers, operating systems, and server configurations supported by that version of the EasyStartup program.
- **User Guide:** This selection provides information about the features provided by that version of the EasyStartup program.
- **Hardware list:** This selection displays a list of hardware devices detected by the EasyStartup program.
- **Configure RAID:** This selection enables you to view the current RAID configuration for each installed RAID controller and make changes if needed.
- **Install operating system:** This selection displays a series of choices and prompts to collect information required for installation, prepares the hard disk for installation, and then initiates the installation process using the user-provided operating-system installation CD or DVD.
- **About:** This selection displays version information and legal notices.

Configuring RAID

The RAID configuration feature that is part of the EasyStartup program enables you to view and change RAID settings for supported RAID controllers. Through this feature, you have the ability to configure each installed controller. The program automatically detects the number of discs currently attached to the controller, determines the possible RAID configurations that can be configured, and prompts you through the steps to configure one or more disc arrays with or without hot-spare drives. As you configure each controller you will be given the option to save the RAID configuration settings to a RAID response file, which you can use on other similarly configured Lenovo servers. This method satisfies most users' needs.

Using LSI Configuration Utility program

Use the LSI Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use this program as described in this document.

- Use the LSI Configuration Utility program to perform the following tasks:
  - Perform a low-level format on a hard disk drive
  - Create an array of hard disk drives with or without a hot-spare drive
  - Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change settings for attached devices.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

- The integrated SAS/SATA controller with RAID capabilities supports the following features:
  - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

    Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.

– Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)

  Use this option to create an integrated mirror enhanced array of three to eight disks, including up to two optional hot spares. All data on the array disks will be deleted.

– Integrated Striping (IS) (also known as RAID 0)

  Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.

- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

To start the LSI Configuration Utility program, complete the following steps:

1. Turn on the server.

   Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt <F1 Setup> is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **System Settings → Adapters and UEFI drivers**.
4. Select **Please refresh this page on the first visit** and press Enter.
5. Select **LSI** *controller_driver_name Driver* and press Enter, where *controller_driver_name* is the name of the SAS/SATA controller driver. For the SAS/SATA controller driver name, see the documentation that comes with your controller.
6. To perform storage-management tasks, follow the procedures in the documentation that comes with the SAS/SATA controller.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.
2. Select **SAS Topology** and press Enter.
3. Select **Direct Attach Devices** and press Enter.

4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.
5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.
2. Select **RAID Properties**.
3. Select the type of array that you want to create.
4. Use the arrow keys to highlight the first drive in the pair; then, press the Minus (-) or Plus (+) key to change the mirror value to **Primary**.
5. Continue to select the next drive using the Minus (-) or Plus (+) key until you have selected all the drives for your array.
6. Press C to create the disk array.
7. Select **Apply changes and exit menu** to create the array.

Typical operating system installation

When you select **Install operating system**, you will be prompted for information required for the installation. The prompts vary depending on the operating system selected. This section describes the tasks associated with a typical Windows operating system installation. Each task must be completed in order before moving to the next task.

Note: Ensure that your RAID controller is correctly configured before you select an operating system to install.

- **Select operating system:** This task enables you to select the operating system that you will be installing.
- **Select disk:** This task enables you to select the disk where you want to install the operating system.

  Note: The disk that you select must be set as the boot disk in UEFI.
- **Partitions options:** This task enables you to choose whether you want to repartition the selected drive or use an existing partition.
- **Partition settings:** This task enables you to choose the file system type and define the partition size.
- **Installation settings:** This task prompts you for user and system settings, the operating system product key, and the administrator password.
- **Network settings:** This task prompts you for domain and workgroup settings, Ethernet controller type, IP address settings, DNS settings, and WINS address settings.
- **Install applications:** This task enables you to run custom commands or scripts at the end of the installation process, install ThinkServer EasyManage software to help you manage your servers, and install the Easy Update program to keep your servers up to date.
- **Install Windows components:** This task enables you to install optional Windows components such as IIS, ASP.NET, and SNMP.
- **Confirm settings:** This task enables you to review all of the information you provided.

- **Save response file:** This task gives you the option of saving the information on a diskette or USB device as a response file for future installations on similarly configured Lenovo servers.
- **Start installation:** This task starts the actual installation process. First, the disk is prepared using the disk and partition information you specified. Then you are prompted to insert the operating system disk, and the operating system is installed using the information that you specified.

Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. Enable and disable the Broadcom Gigabit Ethernet Utility program from the Setup Utility.

To enable the Broadcom Gigabit Ethernet Utility program, do the following:

1. From the Setup Utility main menu, select **Devices and I/O Ports** and press Enter.
2. Select **Enable/Disable onboard devices** and press Enter.
3. Select **Ethernet** and press Enter.
4. Select **Enable** and press Enter.
5. Exit to the main menu and select **Save Settings**.

Configuring the Gigabit Ethernet controller

The Ethernet controllers are integrated on the system board. They provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server supports auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Intel Hartwell 82574L Gigabit Ethernet Software* CD that comes with the server.

Updating the firmware

The firmware in the server is periodically updated and is available for download on the Lenovo Support Web site. Go to http://www.lenovo.com/support to check for the latest level of firmware, such as unified extensible firmware interface (UEFI) code, vital product data (VPD) code, device drivers, and service processor firmware.

When you replace a device in the server, you might have to either update the server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

- UEFI code is stored in ROM on the system board.
- IMM firmware is stored in ROM on the baseboard management controller on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the SAS controller.

- SAS firmware is stored in ROM on the integrated RAID controller on the system board.
- Major components contain vital product data (VPD) code. You can select to update the VPD code during the UEFI code update procedure.

The following items are downloadable at http://www.lenovo.com/support:

- Diagnostic programs
- IMM firmware
- Ethernet firmware

Using the EasyUpdate Firmware Updater tool

ThinkServer EasyUpdate Firmware Updater is a software application that enables you to maintain your system firmware up to date and helps you avoid unnecessary outages. Firmware Updater updates the server firmware in two steps, by updating system and adapter firmware and updating hard disk drive (HDD) firmware.

To update your system, first go the Lenovo Support Web site and obtain the ISO file.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.
5. Download the ThinkServer firmware update media ISO file.
6. Burn the ISO image to CD or DVD.
7. Insert the media in the server CD/DVD drive, and boot the server to that drive.
8. After DOS starts, the master application starts automatically. Hardware detection runs, and a list of applicable firmware updates is displayed.
9. Select the firmware updates that you want to install.

Before distributing the firmware update to other servers, ensure that your server can restart successfully without encountering hardware problems.

Starting the backup server firmware

The system board contains a backup copy area for the server firmware. This is a secondary copy of server firmware that you update only during the process of updating server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the UEFI boot recovery J29 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the UEFI boot recovery J29 jumper back to the primary position (pins 1 and 2).

Using the Integrated Management Module

The Integrated Management Module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and (when IMM Premium is installed) remote presence function in a single chip.

The IMM supports the following basic system management features:

- Environmental monitor with fan speed control for temperature, voltages, fan failure, power supply failure, and power backplane failure.
- LED indicators to report errors that occur with fans, power supplies, microprocessor, hard disk drives, and system errors
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) will disable a failing DIMM that is detected during POST IMM will light the associated system-error LED and the failing DIMM error LED.
- System-event log (SEL)
- ROM-based IMM firmware flash (IMM firmware updates)
- Auto Boot Failure Recovery (ABR)
- A virtual media key which enables full system management support (remote video, remote keyboard/mouse, and remote storage)
- Automatic microprocessor disable on failure restart in a two-microprocessor configuration when one microprocessor signals an internal error
- NMI detection and reporting
- SMI handling
- Automatic Server Restart (ASR) when (1) POST is not complete or (2) the OS hangs and the OS Watchdog Timer times-out. The IMM might be configured to watch for OS Watchdog Timer and reboot the system after timeout, if the ASR feature is enabled. Otherwise, IMM allows the administrator to generate an NMI by pressing an NMI button on the system board for OS memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V 2.0 and Intelligent Platform Management Bus (IPMB) support
- Invalid system configuration (CNFG) LED support
- Serial redirect
- Serial Over LAN (SOL)
- Query power supply input power
- PECI 2 support
- Power/Reset control (power-on, hard and soft shut down, hard and soft reset, schedule power control)
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail)
- Operating system failure blue screen capture
- Command line interface
- Configuration save and restore
- PCI configuration data
- Boot sequence manipulation

The IMM also provides the following remote server management capabilities:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server,

identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). These integrated functions allow you to remotely mount or unmount drives or images on the client system as well as accessing the Web interface.

The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1600 x 1200 at 85 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

Obtaining the IP address for the Web interface access

To access the Web interface and use the remote presence feature, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup Utility. To locate the IP address, do the following:

1. Turn on the server.

   Note: Approximately 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup Utility menu.
3. From the Setup Utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. On the next screen, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup Utility.

Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, complete the following steps:

1. Open a Web browser and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Note: The IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125.

2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   Note: The IMM is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.
3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off of the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

Advanced Settings Utility program

The Advanced Settings Utility (ASU) program is an alternative to the Setup Utility for modifying UEFI settings. Use the ASU program online or out-of-band to modify UEFI settings from the command line without the need to restart the server to access the Setup Utility.

You can also use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

Installing ThinkServer EasyManage software

You can install the ThinkServer EasyManage Core Server program from the ThinkServer EasyManage CD or you can download and install the program from http://www.lenovo.com/support. After one instance of the ThinkServer EasyManage Core Server has been installed, you can use the ThinkServer EasyManage Agent installer to install the agent on other servers and clients on the network.

Also, the ThinkServer EasyStartup™ program provides an option to either install the ThinkServer EasyManage Agent as part of the operating system installation process or install a desktop icon to assist with the installation of the ThinkServer EasyManage Core Server after the operating system has been installed.

Installation requirements

Before installing ThinkServer EasyManage software on your server, your environment must meet the following requirements:

- Microsoft Windows Server 2008 is installed on the server where you intend to install the Core Server.
- The original Windows Server operating system installation CDs are available in case files are needed while installing the prerequisites.
- The server has Internet access to obtain prerequisites and to activate the software after the installation is complete.
- The server has a static IP address.

- The server is not a domain controller. However, it is recommended to have the server join a domain.
- The account that you use to log in and to install the Core Server has Administrator privileges on the server with full read/write access. Ideally, this account is also a Domain Administrator account. This account will be used to create the initial administrator-level account used to log in to the ThinkServer EasyManage console.
- Any previous agent from EasyManage or LANDesk must be removed prior to installing the Core Server and Management Console.

Installation order

The order in which you install the operating system and Windows Components is critical to install ThinkServer EasyManage software successfully. To ensure a clean, working installation of ThinkServer EasyManage software, use the following installation order:

1. Install Microsoft Windows Server 2008 32-bit with the latest Service Pack.
2. Install the following Windows Components: See “Installing Windows 2008 32-bit components.”
3. Use Windows Update to install all available critical updates.
4. Download Microsoft Web Services Enhancement 2.0 Service Pack 3 (LANDesk Process Manager only) from the following Web site: http://www.microsoft.com/downloads/details.aspx?FamilyID=1ba1f631-c3e7-420a-bc1e-ef18bab66122&DisplayLang=en. Install the software using the default settings.

   Note: This specific version is required.
5. Use Windows Update to install all available critical updates.
6. Launch the EasyManage installation.
7. After ThinkServer EasyManage is installed, enable Security and Patch Manager to obtain the LANDesk 8.8 Software Updates. In the console application, click **Help -> LANDesk -> Security Updates** for a guide to configuring Security and Patch Manager.
8. Install Adobe Flash Player 9 if you plan to use the Management Console functions from the same server on which the Core Server is installed. You can obtain Adobe Flash Player 9 from the Adobe Web site: http://www.adobe.com/products/flashplayer/

Installing Windows 2008 32-bit components

To install the Windows Server 2008 32-bit components necessary for a ThinkServer EasyManage core server installation, complete the steps in this section.

Installing Web Server Role (IIS)

To install the Web Server Role (IIS), do the following:

1. Click **Start** -> **Server Manager**.
2. Under Roles Summary, click **Add Roles**. The **Add Roles** wizard appears.
3. Click **Next**.
4. Select the checkbox next to **Web Server (IIS)**. A dialog box displays the additional features that are required.
5. Click **Add Required Features**, then click **Next**. In the list of additional role services that can be installed, ensure that the follow are checked:
   - HTTP Redirection
   - Static Content

- ASP.NET
- ASP
- CGI
- Server Side Includes
- Windows Authentication
- IIS 6 Metabase Compatibility

Note: When you select **ASP.Net** or **ASP**, a dialog box displays the additional role services required. Click **Add Required Role Services**.

6. Click **Install**.

Note: If IIS is already installed and certain Role Services are still required, expand **Roles** in the tree view on the left in Server Manager and click on **Web Server (IIS)**, then click on **Add Role Services**. Select the necessary role services and click **Install**.

Installing Microsoft SNMP services

To install Microsoft SNMP services, do the following:

1. Click **Add Features** in the **Features Summary** section on the main page of Server Manager.
2. Select the **SNMP Services** checkbox.
3. Click **Next**, then **Install**.

Uninstalling the LANDesk Software Agent

If the Core Server has LANDesk agents on it from a previous Management Suite release, it will fail the autorun prerequisite check. You must remove the old agents by running uninstallwinclient.exe from the \Program Files\LANDesk\ ManagementSuite folder.

Chapter 8. Troubleshooting

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot diagnose and correct a problem by using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 179 for more information.

Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you cannot find a problem in these tables, see the ″Running the diagnostic programs″ in the *Hardware Maintenance Manual* for information about testing the server.

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the operator information panel.
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.**

Symptom	Action
The DVD drive is not recognized.	1. Make sure that: • The SATA channel to which the DVD drive is attached (primary or secondary) is enabled in the Setup Utility. • All cables and jumpers are installed correctly. • The signal cable and connector are not damaged and the connector pins are not bent. • The correct device driver is installed for the DVD drive. 2. Run the DVD drive diagnostic programs. 3. Reseat the following components: a. DVD drive b. DVD drive cables 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. DVD drive b. DVD drive and cables c. (Trained service technician only) System board

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- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A DVD is not working correctly.	1. Clean the DVD. 2. Run the DVD drive diagnostic programs. 3. Reseat the DVD drive. 4. Replace the DVD drive.
The DVD drive tray is not working.	1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the DVD drive. 4. Replace the DVD drive.

General problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic tests.	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic tests again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	Run the diagnostic SCSI Fixed Disk Test (see "Running the diagnostic programs" on page 176). **Note:** This test is not available on servers that have RAID arrays or servers that have SATA hard disk drives.

Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	1. Make sure that: • All cables and cords are connected securely to the rear of the server and attached devices. • When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down. 2. Check the system-event log or IMM log (see "Event logs" on page 142). 3. See "Solving undetermined problems" on page 142.

Keyboard, mouse, or pointing-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
All or some keys on the keyboard do not work.	1. Make sure that: • The keyboard cable is securely connected. • The server and the monitor are turned on. 2. See http://www.lenovo.com/thinkserver and click **Options** for keyboard compatibility. 3. If you are using a USB keyboard, run the Setup Utility and enable keyboardless operation to prevent the 301 POST error message from being displayed during startup. 4. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. Keyboard b. (Trained service technician only) System board
The mouse or pointing device does not work.	1. Make sure that: • The mouse or pointing device is compatible with the server. See http://www.lenovo.com/thinkserver and click the **Options** tab. • The mouse or pointing-device cable is securely connected to the server. • The mouse or pointing-device device drivers are installed correctly. • The server and the monitor are turned on. • The mouse is enabled in the Setup Utility. 2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Mouse or pointing device b. (Trained service technician only) System board

Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	1. Make sure that: • No error LEDs are lit on the operator information panel or on the DIMM. • Memory mirroring does not account for the discrepancy. • The memory modules are seated correctly. • You have installed the correct type of memory. • If you changed the memory, you updated the memory configuration in the Setup Utility. • All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled. 2. Check the POST event log for DIMM error messages: • If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM. • If a DIMM was disabled by the user or by POST, run the Setup Utility and enable the DIMM. 3. Run memory diagnostics (see ″Diagnostic programs, messages, and error codes″ in the *Hardware Maintenance Manual*). 4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration (two 512 MB DIMMs; see the information about the minimum required configuration on page "Solving undetermined problems" on page 142). 5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair are matching. 6. Reseat the DIMMs. 7. Replace the DIMMs in step 6, one at a time, in the order shown, restarting the server each time.
Multiple rows of DIMMs in a branch are identified as failing.	1. Reseat the DIMMs; then, restart the server. 2. Replace the lowest-numbered DIMMs with identical known good DIMMs; then, restart the server. Repeat as necessary. If the failures continue after all identified pairs are replaced, go to step4. 3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace each DIMM in the failed pair with an identical known good DIMM, restarting the server after you reinstall each DIMM. Replace the failed DIMM. Repeat step 3 until you have tested all removed DIMMs. 4. (Trained service technician only) Replace the system board.

Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The server emits a continuous beep during POST, indicating that the startup (boot) microprocessor is not working correctly.	1. Correct any errors that are indicated by the system board LEDs (see "System-board LEDs" on page 22). 2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size. 3. (Trained service technician only) Reseat microprocessor 1. 4. (Trained service technician only) If there is no indication of which microprocessor has failed, isolate the error by testing with one microprocessor at a time. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor 2 b. VRM 2 c. (Trained service technician only) System board 6. (Trained service technician only) If multiple error codes indicate a microprocessor error, reverse the locations of two microprocessors to determine whether the error is associated with a microprocessor or with a microprocessor socket. • If the error is associated with a microprocessor, replace the microprocessor. • If the error is associated with a VRM, replace the VRM. • If the error is associated with a microprocessor socket, replace the system board.

Monitor problems

Some monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
Testing the monitor	1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 4. (Trained service technician only) Replace the system board.
The screen is blank.	1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server. 2. Make sure that: • The server is turned on. If there is no power to the server, see "Power problems" on page 138. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. • No POST errors are generated when the server is turned on. 3. Make sure that the correct server is controlling the monitor, if applicable. 4. See "Solving undetermined problems" on page 142.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	1. Make sure that: • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics (see "Running the diagnostic programs" on page 176). • If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 142. • (Trained service technician only) If the server fails the video diagnostics, replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. **Attention:** Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). 2. Reseat the monitor. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board
Wrong characters appear on the screen.	1. If the wrong language is displayed, update the server firmware with the correct language (see "Updating the firmware" on page 122). 2. Reseat the monitor 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Monitor b. (Trained service technician only) System board

Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A Lenovo optional device that was just installed does not work.	1. Make sure that: • The device is designed for the server (see http://www.lenovo.com/thinkserver and click the **Options** tab). • You followed the installation instructions that came with the device and the device is installed correctly. • You have not loosened any other installed devices or cables. • You updated the configuration information in the Setup Utility. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
A Lenovo optional device that used to work does not work now.	1. Make sure that all of the hardware and cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. If the failing device is a SCSI device, make sure that: • The cables for all external SCSI devices are connected correctly. • The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly. • Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server. 4. Reseat the failing device. 5. Replace the failing device.

Power problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The power-control button does not work (the server does not start). **Note:** The power-control button will not function until 3 minutes after the server has been connected to ac power.	1. Make sure that the power-control button is working correctly: a. Disconnect the server power cords. b. Reconnect the power cords. c. (Trained service technician only) Reseat the operator information panel cables, and then repeat steps 1a and 1b. If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel. 2. Make sure that: • The power cords are correctly connected to the server and to a working electrical outlet. • The type of memory that is installed is correct. • The DIMM is fully seated. • The LEDs on the power supply do not indicate a problem. • The microprocessors are installed in the correct sequence. 3. Reseat the following components: a. DIMMs b. (Trained service technician only) Power switch connector c. (Trained service technician only) Power backplane 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) Power switch connector c. (Trained service technician only) Power backplane d. (Trained service technician only) System board 5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports. 6. See "Power-supply LEDs" on page 24. 7. See "Solving undetermined problems" on page 142.
The server does not turn off.	1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, do the following: a. Press Ctrl+Alt+Delete. b. Turn off the server by pressing the power-control button for 5 seconds. c. Restart the server. d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server. 2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.	See "Solving undetermined problems" on page 142.

Serial port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	1. Make sure that: • Each port is assigned a unique address in the Setup Utility and none of the serial ports is disabled. • The serial port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.
A serial device does not work.	1. Make sure that: • The device is compatible with the server. • The serial port is enabled and is assigned a unique address. • The device is connected to the correct connector. 2. Reseat the following components: a. Failing serial device b. Serial cable 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Failing serial device b. Serial cable c. (Trained service technician only) System board

Software problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
You suspect a software problem.	1. To determine whether the problem is caused by the software, make sure that: • The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict. • The software is designed to operate on the server. • Other software works on the server. • The software works on another server. 2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. 3. Contact the software vendor.

Universal Serial Bus (USB) port problems

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	
Symptom	**Action**
A USB device does not work.	1. Run USB diagnostics (see "Running the diagnostic programs" on page 176). 2. Make sure that: • The correct USB device driver is installed. • The operating system supports USB devices. • A standard PS/2 keyboard or mouse is not connected to the server. If it is, a USB keyboard or mouse will not work during POST. 3. Make sure that the USB configuration optional devices are set correctly in the Setup Utility (see "Setup Utility menu choices" on page 110 for more information). 4. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:

1. Turn off the server and disconnect all ac power cords.

2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see “Solving undetermined problems” on page 142 for the minimum configuration).
4. Reconnect all ac power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:

- Make sure that the correct device drivers, which come with the server, are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
  - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
  - If the Ethernet controller is set to operate at 100 Mbps, you must use Category 5 cabling.
  - If you directly connect two servers (without a hub), or if you are not using a hub with X ports, use a crossover cable. To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
  - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
  - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity light is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the LAN activity LEDs on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see “Software problems” on page 140.

Damaged data in CMOS memory or damaged firmware can cause undetermined problems. To reset the CMOS data, use the password switch 2 (SW4) to override the power-on password and clear the CMOS memory; see “System-board switches and jumpers” on page 21.

Check the LEDs on all the power supplies (see “Power-supply LEDs” on page 24). If the LEDs indicate that the power supplies are working correctly, do the following:

1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Modem, printer, mouse, and non-Lenovo devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules. The minimum configuration requirement is 1 GB DIMM per microprocessor (2 GB in a two-microprocessor configuration).

The following minimum configuration is required for the server to start:

- One microprocessor
- One 1 GB DIMM
- One power supply
- Power cord
- ServeRAID SAS adapter
- System board assembly

4. Turn on the server. If the problem remains, suspect the following components in the following order:
   a. Power supply
   b. Power-supply cage
   c. Memory
   d. Microprocessor
   e. System board

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the system board or extender card.

If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

Event logs

Error codes and messages are displayed in the following types of event logs:

- **POST event log:** This log contains the three most recent error codes and messages that were generated during POST. You can view the POST event log through the Setup Utility.

- **System-event log:** This log contains all IMM, POST, and system management interrupt (SMI) events. You can view the system-event log through the Setup Utility and through the Dynamic System Analysis (DSA) program (as the IPMI event log).

  The system-event log is limited in size. When it is full, new entries will not overwrite existing entries; therefore, you must periodically save and then clear the system-event log through the Setup Utility when the IMM logs an event that indicates that the log is more than 75% full. When you are troubleshooting, you might have to save and then clear the system-event log to make the most recent events available for analysis.

  Messages are listed on the left side of the screen, and details about the selected message are displayed on the right side of the screen. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

  Some IMM sensors cause assertion events to be logged when their setpoints are reached. When a setpoint condition no longer exists, a corresponding deassertion event is logged. However, not all events are assertion-type events.
- **Integrated management module (IMM) event log:** This log contains a filtered subset of all IMM, POST, and system management interrupt (SMI) events. You can view the IMM event log through the IMM Web interface and through the Dynamic System Analysis (DSA) program (as the ASM event log).
- **DSA log:** This log is generated by the Dynamic System Analysis (DSA) program, and it is a chronologically ordered merge of the system-event log (as the IPMI event log), the IMM event log (as the ASM event log), and the operating-system event logs. You can view the DSA log through the DSA program.

Viewing event logs through the Setup Utility

To view the POST event log or system-event log, do the following:

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Select **System Event Logs** and use one of the following procedures:
   - To view the POST event log, select **POST Event Viewer**.
   - To view the system-event log, select **System Event Log**.

Viewing event logs without restarting the server

If the server is not hung, methods are available for you to view one or more event logs without having to restart the server.

If you have installed Portable or Installable Dynamic System Analysis (DSA), you can use it to view the system-event log (as the IPMI event log), the IMM event log (as the ASM event log), or the merged DSA log. You can also use DSA Preboot to view these logs, although you must restart the server to use DSA Preboot. To install Portable DSA, Installable DSA, or DSA Preboot or to download a DSA Preboot CD image, go to http://www.lenovo.com/support and complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: http://www.lenovo.com/support.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.

4. Click **Downloads and drivers** to download firmware updates.

If IPMItool is installed in the server, you can use it to view the system-event log. Most recent versions of the Linux operating system come with a current version of IPMItool.

You can view the IMM event log through the **Event Log** link in the integrated management module (IMM) Web interface.

The following table describes the methods that you can use to view the event logs, depending on the condition of the server. The first two conditions generally do not require that you restart the server.

Table 16. Methods for viewing event logs

Condition	Action
The server is not hung and is connected to a network.	Use any of the following methods: • Run Portable or Installable DSA to view the event logs or create an output file that you can send to service and support. • Type the IP address of the IMM and go to the Event Log page. • Use IPMItool to view the system-event log.
The server is not hung and is not connected to a network.	Use IPMItool locally to view the system-event log.
The server is hung.	• If DSA Preboot is installed, restart the server and press F2 to start DSA Preboot and view the event logs. • If DSA Preboot is not installed, insert the DSA Preboot CD and restart the server to start DSA Preboot and view the event logs. • Alternatively, you can restart the server and press F1 to start the Setup Utility and view the POST event log or system-event log. For more information, see “Viewing event logs through the Setup Utility” on page 143.

System-event log

The system-event log contains messages of three types:

Information
Information messages do not require action; they record significant system-level events, such as when the server is started.

Warning
Warning messages do not require immediate action; they indicate possible problems, such as when the recommended maximum ambient temperature is exceeded.

Error Error messages might require action; they indicate system errors, such as when a fan is not detected.

Each message contains date and time information, and it indicates the source of the message (POST or the IMM).

POST error codes

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

If a power-on password is set, you must type the password and press Enter, when you are prompted, for POST to run.

If POST is completed without detecting any problems, the server startup is completed.

If POST detects a problem, an error message is sent to the POST event log.

The following table describes the POST error codes and suggested actions to correct the detected problems. These errors can appear as severe, warning, or informational.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0010002	Microprocessor not supported	1. Reseat the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor 1 b. (Trained service technician only) Microprocessor 2 (if one is installed) 2. (Trained service technician only) Remove microprocessor 2 and restart the server. 3. (Trained service technician only) Remove microprocessor 1 and install microprocessor 2 in the microprocessor 1 connector. Restart the server. If the error is corrected, microprocessor 1 is bad and must be replaced. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor 1 b. (Trained service technician only) Microprocessor 2 c. (Trained service technician only) System board
0011000	Invalid microprocessor type	1. Update the firmware (see "Updating the firmware" on page 122). 2. (Trained service technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0011002	Microprocessor mismatch	1. Run the Setup utility and view the microprocessor information to compare the installed microprocessor specifications. 2. (Trained service technician only) Remove and replace one of the microprocessors so that they both match.
0011004	Microprocessor failed BIST	1. Update the firmware (see "Updating the firmware" on page 122). 2. (Trained service technician only) Reseat microprocessor 2. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
001100A	Microcode update failed	1. Update the server firmware (see "Updating the firmware" on page 122). 2. (Trained service technician only) Replace the microprocessor.
0050001	DIMM disabled	1. If the server fails the POST memory test, reseat the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit (see "Removing a memory module" on page 37 and "Installing a memory module" on page 38). 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.
0051003	Uncorrectable DIMM error	1. If the server failed the POST memory test, reseat the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit (see "Removing a memory module" on page 37 and "Installing a memory module" on page 38). 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.
0051006	DIMM mismatch detected	Make sure that the DIMMs match and are installed in the correct sequence (see "Installing a memory module" on page 38).

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
0051009	No memory detected	1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see "Installing a memory module" on page 38).
005100A	No usable memory detected	1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see "Installing a memory module" on page 38). 4. Clear CMOS memory to re-enable all the memory connectors.
0058001	PFA threshold exceeded	1. Update the firmware (see"Updating the firmware" on page 122). 2. Reseat the DIMMs and run the memory test. 3. Replace the failing DIMM, which is indicated by a lit LED on the system board.
0058007	DIMM population is unsupported	1. Reseat the DIMMs, and then restart the server. 2. Remove the lowest-numbered DIMM pair of those that are identified, replace it with an identical pair of known good DIMMs, and then restart the server. Repeat as necessary. If the failures continue, go to step 4. 3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace the DIMMs in the failed pair with identical known good DIMMs, restarting the server after each DIMM is installed. Replace the failed DIMM. Repeat this step until you have tested all removed DIMMs. 4. (Trained service technician only) Replace the system board.
0058008	DIMM failed memory test	1. Reseat the DIMMs, and then restart the server. 2. Replace the following components one at a time, in the order shown, restarting the server each time: a. DIMMs b. (Trained service technician only) System board
00580A1	Invalid DIMM population for mirroring mode	1. If a fault LED is lit, resolve the failure. 2. Install the DIMMs in the correct sequence (see "Installing a memory module" on page 38).
00580A4	Memory population changed	Information only. Memory has been added, moved, or changed.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
00580A5	Mirror failover complete	Information only. Memory redundancy has been lost. Check the event log for uncorrected DIMM failure events.
0068002	CMOS battery cleared	1. Reseat the battery. 2. Clear the CMOS memory (see "System-board switches and jumpers" on page 21). 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board
2011000	PCI-X PERR	1. Check the extender card LEDs. 2. Reseat all affected adapters and extender cards. 3. Update the PCI device firmware. 4. Remove the adapters from the extender card. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. Extender card b. (Trained service technician only) System board
2011001	PCI-X SERR	1. Check the extender-card LEDs. 2. Reseat all affected adapters and extender cards. 3. Update the PCI device firmware. 4. Remove the adapters from the extender card. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. Extender card b. (Trained service technician only) System board
2018001	PCI Express uncorrected or uncorrected error	1. Check the extender-card LEDs. 2. Reseat all affected adapters and extender cards. 3. Update the PCI device firmware. 4. Remove both adapters from the extender card. 5. Replace the following components one at a time, in the order shown, restarting the server each time: a. Extender card b. (Trained service technician only) System board

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
2018002	Option ROM resource allocation failure	Informational message that some devices might not be initialized. 1. If possible, rearrange the order of the adapters in the PCI slots to change the load order of the optional-device ROM code. 2. Run the Setup utility, select **Start Options**, and change the boot priority to change the load order of the optional-device ROM code. 3. Run the Setup utility and disable some other resources, if their functions are not being used, to make more space available. Select **Devices and I/O Ports** to disable any of the integrated devices. 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Each adapter b. (Trained service technician only) System board
3*xx*0007 (*xx* can be 00 - 19)	Firmware fault detected, system halted	1. Recover the server firmware to the latest level. 2. Undo any recent configuration changes, or clear CMOS memory to restore the settings to the default values. 3. Remove any recently installed hardware.
3038003	Firmware corrupted	1. Run the Setup utility, select **Load Default Settings**, and save the settings to recover the server firmware. 2. (Trained service technician only) Replace the system board.
3048005	Booted secondary (backup) server firmware image	Information only. The backup switch was used to boot the secondary bank.
3048006	Booted secondary (backup) server firmware image because of ABR	1. Run the Setup utility, select **Load Default Settings**, and save the settings to recover the primary server firmware settings. 2. Turn off the server and remove it from the power source. 3. Reconnect the server to the power source, and then turn on the server.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
305000A	RTC date/time is incorrect	1. Adjust the date and time settings in the Setup utility, and then restart the server. 2. Reseat the battery. 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. (Trained service technician only) System board
3058001	System configuration invalid	1. Run the Setup utility, and select **Save Settings**. 2. Run the Setup utility, select **Load Default Settings**, and save the settings. 3. Reseat the following components one at a time in the order shown, restarting the server each time: a. Battery b. Failing device (if the device is a FRU, it must be reseated by a trained service technician only) 4. Replace the following components one at a time, in the order shown, restarting the server each time: a. Battery b. Failing device (if the device is a FRU, it must be replaced by a trained service technician only) c. (Trained service technician only) System board
3058004	Three boot failures	1. Undo any recent system changes, such as new settings or newly installed devices. 2. Make sure that the server is attached to a reliable power source. 3. Remove all hardware that is not listed on the ServerProven Web site. 4. Make sure that the operating system is not corrupted. 5. Run the Setup utility, save the configuration, and then restart the server.
3108007	System configuration restored to default settings	Information only. This is message is usually associated with the CMOS battery clear event.
3138002	Boot configuration error	1. Remove any recent configuration changes that you made in the Setup utility. 2. Run the Setup utility, select **Load Default Settings**, and save the settings.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
3808000	IMM communication failure	1. Remove power from the server for 30 seconds, and then reconnect the server to power and restart it. 2. Update the IMM firmware. 3. (Trained service technician only) Replace the system board.
3808002	Error updating system configuration to IMM	1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup utility and select **Save Settings**. 3. Update the firmware.
3808003	Error retrieving system configuration from IMM	1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup utility and select **Save Settings**. 3. Update the IMM firmware.
3808004	IMM system event log full	• When out-of-band, use the IMM Web interface or IPMItool to clear the logs from the operating system. • When using the local console: 1. Run the Setup utility. 2. Select **System Event Logs**. 3. Select **Clear System Event Log**. 4. Restart the server.
3818001	Core Root of Trust Measurement (CRTM) update failed	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818002	Core Root of Trust Measurement (CRTM) update aborted	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818003	Core Root of Trust Measurement (CRTM) flash lock failed	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818004	Core Root of Trust Measurement (CRTM) system error	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Error code	Description	Action
3818005	Current Bank Core Root of Trust Measurement (CRTM) capsule signature invalid	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.
3818006	Opposite bank CRTM capsule signature invalid	1. Switch the firmware bank to the backup bank. 2. Run the Setup utility, select **Load Default Settings**, and save the settings. 3. Switch the bank back to the current bank. 4. (Trained service technician only) Replace the system board.
3818007	CRTM update capsule signature invalid	1. Run the Setup utility, select **Load Default Settings**, and save the settings. 2. (Trained service technician only) Replace the system board.

Integrated management module error messages

The following table describes the IMM error messages and suggested actions to correct the detected problems. For more information about IMM, see the *IMM User's Guide* on the Web.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Message	Severity	Description	Action
Numeric sensor Ambient Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	Reduce the ambient temperature.
Numeric sensor Ambient Temp going high (upper non-recoverable) has asserted.	Error	An upper nonrecoverable sensor going high has asserted.	Reduce the ambient temperature.
Numeric sensor Planar 3.3 V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 3.3 V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 5 V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 5 V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Numeric sensor Planar 12 V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	Check the power-supply LED.
Numeric sensor Planar 12 V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	Check the power-supply LED.
Numeric sensor Planar VBAT going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	Replace the 3 V battery.
Numeric sensor Fan *n* Tach going low (lower critical) has asserted. (*n* = fan number)	Error	A lower critical sensor going low has asserted.	1. Reseat the failing fan *n*, which is indicated by a lit LED on the fan. 2. Replace the failing fan. (*n* = fan number)
The Processor CPU *n*Status has Failed with IERR. (*n* = microprocessor number)	Error	A processor failed - IERR condition has occurred.	1. Make sure that the latest levels of firmware and device drivers are installed for all adapters and standard devices, such as Ethernet, SCSI, and SAS. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Run the DSA program for the hard disk drives and other I/O devices. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
An Over-Temperature Condition has been detected on the Processor CPU *n*Status. (*n* = microprocessor number)	Error	An overtemperature condition has occurred for microprocessor *n*. (*n* = microprocessor number)	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)
The Processor CPU *n* Status has Failed with FRB1/BIST condition. (*n* = microprocessor number)	Error	A processor failed - FRB1/BIST condition has occurred.	1. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and fan sink" on page 101 for information about microprocessor requirements). 3. (Trained service technician only) Reseat microprocessor *n*. 4. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
The Processor CPU *n* Status has a Configuration Mismatch. (*n* = microprocessor number)	Error	A processor configuration mismatch has occurred.	1. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and fan sink" on page 101 for information about microprocessor requirements). 2. (Trained service technician only) Replace the incompatible microprocessor.
An SM BIOS Uncorrectable CPU complex error for Processor CPU *n* Status has asserted. (*n* = microprocessor number)	Error	An SMBIOS uncorrectable CPU complex error has asserted.	1. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Make sure that the installed microprocessors are compatible with each other (see "Installing a microprocessor and fan sink" on page 101 for information about microprocessor requirements). 3. (Trained service technician only) Reseat microprocessor *n*. 4. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor CPU *n* OverTemp has transitioned to critical from a less severe state. (*n* = microprocessor number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)
Sensor CPU *n* OverTemp has transitioned to non-recoverable from a less severe state. (*n* = microprocessor number)	Error	A sensor has changed to Nonrecoverable state from a less severe state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)
Sensor CPU *n* OverTemp has transitioned to critical from a non-recoverable state. (*n* = microprocessor number)	Error	A sensor has changed to Critical state from Nonrecoverable state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor CPU *n* OverTemp has transitioned to non-recoverable. (*n* = microprocessor number)	Error	A sensor has changed to Nonrecoverable state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor *n* is installed correctly. 3. (Trained service technician only) Replace microprocessor *n*. (*n* = microprocessor number)
A diagnostic interrupt has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	An operator information panel NMI/diagnostic interrupt has occurred.	If the NMI button on the system board has not been pressed, do the following: 1. Make sure that the NMI button is not pressed. 2. Replace the operator information panel cable. 3. Replace the operator information panel.
A bus timeout has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus timeout has occurred.	1. Remove the adapter from the PCI slot that is indicated by a lit LED. 2. Replace the extender card. 3. Remove all PCI adapters. 4. (Trained service technicians only) Replace the system board.
A software NMI has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A software NMI has occurred.	1. Check the device driver. 2. Reinstall the device driver.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem. ElementName)	Error	A POST error has occurred. (Sensor = ABR Status)	1. Recover the server firmware from the backup page (see "Starting the backup server firmware" on page 123). 2. Update the server firmware to the latest level. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem. ElementName)	Error	A POST error has occurred. (Sensor = Firmware Error)	1. Update the server firmware on the primary page. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. (Trained service technician only) Replace the system board.
A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = Critical Int PCI)	1. Check the system-event log. 2. Check the PCI error LEDs. 3. Remove the adapter from the indicated PCI slot. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = Critical Int CPU)	1. Check the system-event log. 2. Check the microprocessor error LEDs. 3. Remove the failing microprocessor from the system board. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. Make sure that the two microprocessors are matching. 6. (Trained service technician only) Replace the system board.
A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = Critical Int DIM)	1. Check the system-event log. 2. Check the DIMM error LEDs. 3. Remove the failing DIMM from the system board. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. Make sure that the installed DIMMs are supported and configured correctly. 6. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor Sys Board Fault has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state.	1. Check the system-event log. 2. Check for an error LED on the system board. 3. Replace any failing device. 4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained service technician only) Replace the system board.
The Power Supply (Power Supply: *n*) has Failed. (*n* = power supply number)	Error	Power supply *n* has failed. (*n* = power supply number)	1. If the power-on LED is lit, do the following: a. Reduce the server to the minimum configuration. b. Reinstall the components one at a time, restarting the server each time. c. If the error recurs, replace the component that you just reinstalled. 2. Reseat power supply *n*. 3. Replace power supply *n*. (*n* = power supply number)
Sensor PS *n* Fan Fault has transitioned to critical from a less severe state. (*n* = power supply number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan. 2. Replace power supply *n*. (*n* = power supply number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor Pwr Rail A Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. (Trained service technician only) Remove the PCI adapter and microprocessor 1. Reinstall the microprocessor in socket 1 and restart the server. 3. Restart the server. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained service technician only) Replace the system board.
Sensor Pwr Rail B Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. (Trained service technician only) Remove the PCI adapter and microprocessor 2. 3. Restart the server. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained service technician only) Replace the system board.
Sensor Pwr Rail C Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. Remove the hard disk drives, hard disk drive backplanes, and DIMMs in connectors 1 through 8. 3. Restart the server. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor Pwr Rail D Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. Remove the optical drive and the DIMMs in connectors 9 through 16. 3. Restart the server. 4. Reinstall the microprocessor in socket 1 and restart the server. 5. (Trained service technician only) Replace the failing microprocessor. 6. (Trained service technician only) Replace the system board.
Sensor Pwr Rail E Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. (Trained service technician only) Remove the optical drive and the PCI adapter. 3. Restart the server. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained service technician only) Replace the system board.
Sensor Pwr Rail F Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Turn off the server and disconnect it from power. 2. Remove the hard disk drives and the hard disk drive backplanes. 3. Restart the server. 4. Reinstall each device, one at a time, starting the server each time to isolate the failing device. 5. Replace the failing device. 6. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Sensor PS *n* Therm Fault has transitioned to critical from a less severe state. (*n* = power supply number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan. 2. Replace power supply *n*. (*n* = power supply number)
Sensor PS *n* 12 V OV Fault has transitioned to non-recoverable. (*n* = power supply number)	Error	A sensor has changed to Nonrecoverable state.	1. Check the power-supply LED. 2. Remove the power supplies. 3. Replace power supply *n*. 4. (Trained service technician only) Replace the system board. (*n* = power supply number)
Sensor PS *n* 12 V UV Fault has transitioned to non-recoverable.	Error	A sensor has changed to Nonrecoverable state.	1. Check the power-supply LED. 2. Remove the power supplies. 3. Replace power supply *n*. 4. (Trained service technician only) Replace the system board. (*n* = power supply number)
Sensor PS *n* 12 V OC Fault has transitioned to non-recoverable. (*n* = power supply number)	Error	A sensor has changed to Nonrecoverable state.	1. Check the power-supply LED. 2. Remove the power supplies. 3. Replace power supply *n*. 4. (Trained service technician only) Replace the system board. (*n* = power supply number)
Sensor PS *n* VCO Fault has transitioned to non-recoverable. (*n* = power supply number)	Error	A sensor has changed to Nonrecoverable state.	1. Check the power-supply LED. 2. Replace the failing power supply. (*n* = power supply number)
Redundancy Power Unit has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Check the LEDs for both power supplies. 2. Follow the actions in "Power-supply LEDs" on page 24.

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Redundancy Cooling Zone 1 has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Make sure that the connector on fan 1 and fan 4 (if installed) is not damaged. 2. Make sure that the fan connectors on the system board are not damaged. 3. Make sure that the fan cage is correctly installed. 4. Reseat the fan. 5. Replace the fan.
Redundancy Cooling Zone 2 has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Make sure that the connector on fan 2 and fan 5 (if installed) is not damaged. 2. Make sure that the fan connectors on the system board are not damaged. 3. Make sure that the fan cage is correctly installed. 4. Reseat the fan. 5. Replace the fan.
Redundancy Cooling Zone 3 has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Make sure that the connector on fan 3 and fan 6 (if installed) is not damaged. 2. Make sure that the fan connectors on the system board are not damaged. 3. Make sure that the fan cage is correctly installed. 4. Reseat the fan. 5. Replace the fan.
Sensor RAID Error has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state.	1. Check the hard disk drive LEDs. 2. Reseat the hard disk drive for which the status LED is lit. 3. Replace the defective hard disk drive.
The Drive *n* Status has been removed from unit Drive 0 Status. (*n* = hard disk drive number)	Error	A drive has been removed.	Reseat hard disk drive *n*. (*n* = hard disk drive number)

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The Drive *n* Status has been disabled due to a detected fault. (*n* = hard disk drive number)	Error	A drive has been disabled because of a fault.	1. Run the hard disk drive diagnostic test on drive *n*. 2. Reseat the following components: a. Hard disk drive b. Cable from the system board to the backplane 3. Replace the following components one at a time, in the order shown, restarting the server each time: a. Hard disk drive b. Cable from the system board to the backplane c. Hard disk drive backplane (*n* = hard disk drive number)
Array %1 is in critical condition. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in Critical state. (Sensor = Drive *n* Status) (*n* = hard disk drive number)	Replace the hard disk drive that is indicated by a lit status LED.
Array %1 has failed. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in Failed state. (Sensor = Drive *n* Status) (*n* = hard disk drive number)	Replace the hard disk drive that is indicated by a lit status LED.
Memory uncorrectable error detected for DIMM All DIMMs on Memory Subsystem All DIMMs.	Error	A memory uncorrectable error has occurred.	1. If the server failed the POST memory test, reseat the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. **Note:** You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.
Memory Logging Limit Reached for DIMM All DIMMs on Memory Subsystem All DIMMs.	Error	The memory logging limit has been reached.	1. Update the server firmware to the latest level. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.

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Memory DIMM Configuration Error for All DIMMs on Memory Subsystem All DIMMs.	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Memory uncorrectable error detected for DIMM One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	A memory uncorrectable error has occurred.	1. If the server failed the POST memory test, reseat the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. **Note:** You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.
Memory Logging Limit Reached for DIMM One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	The memory logging limit has been reached.	1. Update the server firmware to the latest level. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.
Memory DIMM Configuration Error for One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Memory uncorrectable error detected for DIMM *n* Status on Memory Subsystem DIMM *n* Status. (*n* = DIMM number)	Error	A memory uncorrectable error has occurred.	1. If the server failed the POST memory test, reseat the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. **Note:** You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test. 5. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Memory Logging Limit Reached for DIMM *n*Status on Memory Subsystem DIMM*n*Status. (*n* = DIMM number)	Error	The memory logging limit has been reached.	1. Update the server firmware to the latest level. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.
Memory DIMM Configuration Error for DIMM *n* Status on Memory Subsystem DIMM *n* Status. (*n* = DIMM number)	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Sensor DIMM *n* Temp has transitioned to critical from a less severe state. (*n* = DIMM number)	Error	A sensor has changed to Critical state from a less severe state.	1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. If a fan has failed, complete the action for a fan failure. 3. Replace DIMM *n*. (*n* = DIMM number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
A PCI PERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI PERR has occurred. (Sensor = PCI Slot *n*; *n* = PCI slot number)	1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove the adapter from slot *n*. 5. Replace the PCI. 6. Replace extender card *n*. (*n* = PCI slot number)
A PCI SERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI SERR has occurred. (Sensor = PCI Slot *n*; *n* = PCI slot number)	1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove the adapter from slot *n*. 5. Replace the PCI. 6. Replace extender card *n*. (*n* = PCI slot number)

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the ″Parts Listing″ section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
A PCI PERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI PERR has occurred. (Sensor = One of PCI Err)	1. Check the extender-card LEDs. 2. Reseat the affected adapters and riser card. 3. Update the server and adapter firmware (UEFI and IMM). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove both adapters. 5. Replace the PCI. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.
A PCI SERR has occurred on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error	A PCI SERR has occurred. (Sensor = One of PCI Err)	1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove both adapters. 5. Replace the PCI. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Fault in slot System board on system %1. (%1 = CIM_ComputerSystem. ElementName)	Error		1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 4. Remove both adapters. 5. Replace the PCI. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.
Redundancy Backup Mem Status has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures. 2. Re-enable mirroring in the Setup utility.
IMM Network Initialization Complete.	Info	An IMM network has completed initialization.	No action; information only.
Certificate Authority %1 has detected a %2 Certificate Error.	Error	A problem has occurred with the SSL Server, SSL Client, or SSL Trusted CA certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated by the **Generate a New Key and Certificate Signing Request** link.	1. Make sure that the certificate that you are importing is correct. 2. Try importing the certificate again.
Ethernet Data Rate modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.Speed; %2 = CIM_EthernetPort.Speed; %3 = user ID)	Info	A user has modified the Ethernet port data rate.	No action; information only.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.FullDuplex; %2 = CIM_EthernetPort.FullDuplex; %3 = user ID)	Info	A user has modified the Ethernet port duplex setting.	No action; information only.
Ethernet MTU setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort. ActiveMaximumTransmissionUnit; %2 = CIM_EthernetPort. ActiveMaximumTransmissionUnit; %3 = user ID)	Info	A user has modified the Ethernet port MTU setting.	No action; information only.
Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort. NetworkAddresses; %2 = CIM_EthernetPort. NetworkAddresses; %3 = user ID)	Info	A user has modified the Ethernet port MAC address setting.	No action; information only.
Ethernet interface %1 by user %2. (%1 = CIM_EthernetPort.EnabledState; %2 = user ID)	Info	A user has enabled or disabled the Ethernet interface.	No action; information only.
Hostname set to %1 by user %2. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = user ID)	Info	A user has modified the host name of the IMM.	No action; information only.
IP address of network interface modified from %1 to %2 by user %3. (%1 = CIM_IPProtocolEndpoint. IPv4Address; %2 = CIM_StaticIPAssignment SettingData.IPAddress; %3 = user ID)	Info	A user has modified the IP address of the IMM.	No action; information only.
IP subnet mask of network interface modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. SubnetMask; %2 = CIM_StaticIPAssignment SettingData.SubnetMask; %3 = user ID)	Info	A user has modified the IP subnet mask of the IMM.	No action; information only.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
IP address of default gateway modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. GatewayIPv4Address; %2 = CIM_StaticIPAssignment SettingData. DefaultGatewayAddress; %3 = user ID)	Info	A user has modified the default gateway IP address of the IMM.	No action; information only.
OS Watchdog response %1 by %2. (%1 = Enabled or Disabled; %2 = user ID)	Info	A user has enabled or disabled an OS Watchdog.	No action; information only.
DHCP[%1] failure, no IP address assigned. (%1 = IP address, *xxx.xxx.xxx.xxx*)	Info	A DHCP server has failed to assign an IP address to the IMM.	1. Make sure that the network cable is connected. 2. Make sure that there is a DHCP server on the network that can assign an IP address to the IMM.
Remote Login Successful. Login ID: %1 from %2 at IP address %3. (%1 = user ID; %2 = ValueMap(CIM_ProtocolEndpoint. ProtocolIFType; %3 = IP address, *xxx.xxx.xxx.xxx*)	Info	A user has successfully logged in to the IMM.	No action; information only.
Attempting to %1 server %2 by user %3.	Info	A user has used the IMM to perform a power function on the server.	No action; information only.
Security: Userid: '%1' had %2 login failures from WEB client at IP address %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from a Web browser and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
Security: Login ID: '%1' had %2 login failures from CLI at %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from the command-line interface and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
Remote access attempt failed. Invalid userid or password received. Userid is '%1' from WEB browser at IP address %2. (%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has attempted to log in from a Web browser by using an invalid login ID or password.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Remote access attempt failed. Invalid userid or password received. Userid is '%1' from TELNET client at IP address %2. (%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has attempted to log in from a Telnet session by using an invalid login ID or password.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
The Chassis Event Log (CEL) on system %1 cleared by user %2. (%1 = CIM_ComputerSystem. ElementName; %2 = user ID)	Info	A user has cleared the IMM event log.	No action; information only.
IMM reset was initiated by user %1. (%1 = user ID)	Info	A user has initiated a reset of the IMM.	No action; information only.
ENET[0] DHCP-HSTN=%1, DN=%2, IP@=%3, SN=%4, GW@=%5, DNS1@=%6. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = CIM_DNSProtocolEndpoint. DomainName; %3 = CIM_IPProtocolEndpoint. IPv4Address; %4 = CIM_IPProtocolEndpoint. SubnetMask; %5 = IP address, *xxx.xxx.xxx.xxx*; %6 = IP address, *xxx.xxx.xxx.xxx*)	Info	The DHCP server has assigned an IMM IP address and configuration.	No action; information only.
ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = CIM_StaticIPSettingData. IPv4Address; %3 = CIM_StaticIPSettingData. SubnetMask; %4 = CIM_StaticIPSettingData. DefaultGatewayAddress)	Info	An IMM IP address and configuration have been assigned using client data.	No action; information only.
LAN: Ethernet[0] interface is no longer active.	Info	The IMM Ethernet interface has been disabled.	No action; information only.
LAN: Ethernet[0] interface is now active.	Info	The IMM Ethernet interface has been enabled.	No action; information only.
DHCP setting changed to by user %1. (%1 = user ID)	Info	A user has changed the DHCP mode.	No action; information only.
IMM: Configuration %1 restored from a configuration file by user %2. (%1 = CIM_ConfigurationData. ConfigurationName; %2 = user ID)	Info	A user has restored the IMM configuration by importing a configuration file.	No action; information only.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Watchdog %1 Screen Capture Occurred. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture was successful.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.
Watchdog %1 Failed to Capture Screen. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture failed.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system. 6. Update the IMM firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
Running the backup IMM main application.	Error	The IMM has resorted to running the backup main application.	Update the IMM firmware. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
Please ensure that the IMM is flashed with the correct firmware. The IMM is unable to match its firmware to the server.	Error	The server does not support the installed IMM firmware version.	Update the IMM firmware to a version that the server supports. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
IMM reset was caused by restoring default values.	Info	The IMM has been reset because a user has restored the configuration to its default settings.	No action; information only.
IMM clock has been set from NTP server %1.	Info	The IMM clock has been set to the date and time that is provided by the Network Time Protocol server.	No action; information only.
SSL data in the IMM configuration data is invalid. Clearing configuration data region and disabling SSL+H25.	Error	There is a problem with the certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated through the **Generate a New Key and Certificate Signing Request** link.	1. Make sure that the certificate that you are importing is correct. 2. Try to import the certificate again.
Flash of %1 from %2 succeeded for user %3. (%1 = CIM_ManagedElement. ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	A user has successfully updated one of the following firmware components: • IMM main application • IMM boot ROM • Server firmware • Diagnostics • Integrated service processor	No action; information only.
Flash of %1 from %2 failed for user %3. (%1 = CIM_ManagedElement. ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	An attempt to update a firmware component from the interface and IP address has failed.	Try to update the firmware again.
The Chassis Event Log (CEL) on system %1 is 75% full. (%1 = CIM_ComputerSystem. ElementName)	Info	The IMM event log is 75% full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.** • **See the "Parts Listing" section in the** *Hardware Maintenance Manual* **to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).** • **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**			
The Chassis Event Log (CEL) on system %1 is 100% full. (%1 = CIM_ComputerSystem. ElementName)	Info	The IMM event log is full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
%1 Platform Watchdog Timer expired for %2. (%1 = OS Watchdog or Loader Watchdog; %2 = OS Watchdog or Loader Watchdog)	Error	A Platform Watchdog Timer Expired event has occurred.	1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.
IMM Test Alert Generated by %1. (%1 = user ID)	Info	A user has generated a test alert from the IMM.	No action; information only.
Security: Userid: '%1' had %2 login failures from an SSH client at IP address %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*)	Error	A user has exceeded the maximum number of unsuccessful login attempts from SSH and has been prevented from logging in for the lockout period.	1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.

Diagnostic programs, messages, and error codes

The diagnostic programs are the primary method of testing the major components of the server. As you run the diagnostic programs, text messages and error codes are displayed on the screen and are saved in the test log. A diagnostic text message or error code indicates that a problem has been detected; to determine what action you should take as a result of a message or error code, see the diagnostics messages in the *Hardware Maintenance Manual*.

Running the diagnostic programs

To run the diagnostic programs, do the following:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt `Press F2 for Dynamic System Analysis (DSA)` is displayed, press F2.

   Note: The DSA preboot diagnostics program might appear to be unresponsive for an unusual length of time when you start the program. This is normal operation while the program loads.
4. Optionally, select **Quit to DSA** to exit from the stand-alone memory diagnostic program.

Note: After you exit from the stand-alone memory diagnostic environment, you must restart the server to access the stand-alone memory diagnostic environment again.

5. Select **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the diagnostic programs do not detect any hardware errors but the problem remains during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with your software.

A single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

Exception: If multiple error codes indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 134 for information about diagnosing microprocessor problems.

If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

Diagnostic text messages

Diagnostic text messages are displayed while the tests are running. A diagnostic text message contains one of the following results:

Passed: The test was completed without any errors.

Failed: The test detected an error.

User Aborted: You stopped the test before it was completed.

Not Applicable: You attempted to test a device that is not present in the server.

Aborted: The test could not proceed because of the server configuration.

Warning: The test could not be run. There was no failure of the hardware that was being tested, but there might be a hardware failure elsewhere, or another problem prevented the test from running; for example, there might be a configuration problem, or the hardware might be missing or is not being recognized.

The result is followed by an error code or other additional information about the error.

Viewing the test log

To view the DSA log when the tests are completed, select **Utility** from the top of the screen and then select **View Test Log**. To view a detailed test log, press Tab while you view the DSA log. The DSA log data is maintained only while you are running the diagnostic programs. When you exit from the diagnostic programs, the DSA log is cleared.

To save the DSA log to a file on a diskette or to the hard disk, click **Save Log** on the diagnostic programs screen and specify a location and name for the saved log file.

Notes:

1. To create and use a diskette, you must add an optional external diskette drive to the server.
2. To save the test log to a diskette, you must use a diskette that you have formatted yourself; this function does not work with pre-formatted diskettes. If the diskette has sufficient space for the test log, the diskette can contain other data.

Diagnostics messages

The table that describes the messages that the diagnostic programs might generate and suggested actions to correct the detected problems is located in the *Hardware Maintenance Manual*.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you. This section contains information about where to go for additional information about Lenovo and Lenovo products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual*.
- Go to the at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by using the information available on the Lenovo support site or by following the troubleshooting procedures that Lenovo provides in the documentation that is provided with your Lenovo product. The documentation that comes with Lenovo systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. Most of the documentation for your server is on the *ThinkServer Documentation* DVD provided with your server. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support and follow the instructions.

Getting help and information from the World Wide Web

On the World Wide Web, the Lenovo Web site has up-to-date information about Lenovo systems, optional devices, services, and support. For general information about Lenovo products or to purchase Lenovo products, go to http://www.lenovo.com. For support on Lenovo products, go to http://www.lenovo.com/support.

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Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:

- **Problem determination -** Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair -** If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management -** There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) available that apply to your hardware.

These items are not covered by the warranty:

- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the safety and warranty information provided with your computer.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:

- Machine type and model
- Serial numbers of our hardware products
- Description of the problem
- Exact working of any error messages
- Hardware and software configuration information

Using other services

If you travel with a Lenovo notebook computer or relocate your computer to a country where your desktop, notebook, or server machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft® Windows® product, refer to the Microsoft Product Support Services Web site at http://www.support.microsoft.com/directory/, or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at http://www.lenovo.com/.

Lenovo product service

台灣 Lenovo 產品服務資訊如下：
荷蘭商聯想股份有限公司台灣分公司
台北市信義區信義路五段七號十九樓之一
服務電話：0800-000-700

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

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1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

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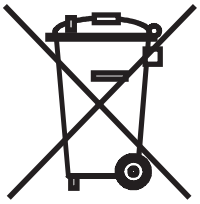
Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. Information on Lenovo product recycling offerings can be found on Lenovo's Internet site at http://www.lenovo.com/lenovo/environment/recycling.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. Lenovo recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. Lenovo dispone de una serie de programas y servicios de devolución de productos, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de Lenovo en el sitio web de Lenovo http://www.lenovo.com/lenovo/environment/recycling.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local Lenovo representative.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the server to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the server, Lenovo may condition provision of repair or replacement of servers or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 17. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

Table 17. Limits for particulates and gases (continued)

Contaminant	Limits
[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. [2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction. [3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

Compliance with Republic of Turkey Directive on the Restriction of Hazardous Substances

Meets requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment (EEE).

Türkiye EEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın
“Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin
Kullanımının Sınırlandırılmasına Dair Yönetmelik (EEE)”
direktiflerine uygundur.

EEE Yönetmeliğine Uygundur.

Recycling statements for Japan

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機が使用済みとなり廃棄される場合は、廃棄物処理法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/pcrecycle

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003 年10 月1 日よりスタートしました。詳細については、以下のURL にアクセスしてください。
http://www.ibm.com/jp/pc/service/recycle/personal

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など) が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to http://www.lenovo.com/lenovo/environment or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.

For the European Union:

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueue dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses

batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to http://www.lenovo.com/lenovo/environment.

For California:

Perchlorate material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Germany Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein

Dieses Produkt entspricht dem “Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln” EMVG (früher “Gesetz über die elektromagnetische Verträglichkeit von Geräten”). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: “Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.”

Nach dem EMVG: “Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.” (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japan Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Taiwan Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

People's Republic of China Class A warning statement

声　　明

此为Ａ级产品，在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korea Class A warning statement

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